INDUSTRIAL REFRIGERATION

NO RUST —

G-W CORROSION-PROOF BREAKER-ELEVATOR GIVES ALL-CLEAN ICE ALL THE TIME

MORE PROFIT
NO RUST = NO WASTE

The Whole Cake is Salable

Clear, *clean ice* from all of every cake – that's what you count on to keep profits from melting. And more profit is what you get with the G-W Breaker-Elevator – because every part of it is corrosion-proofed.

Breaker and elevator casing, breaker plates, shafting, flights, sprockets are aluminum alloy or stainless steel. Even after this G-W Breaker has been standing idle, ice particles emerge rust-free and usable.

Corrosion-proofing isn't the only feature of the G-W Breaker-Elevator that was planned with your profit in mind. Snow ice and fines are reduced to a minimum because the *curved picks* strike the cake at right angles, imitating the slicing feed action of hand shaving. Particles are passed without additional crushing through the *comb plate* because the *breaker drum* is ribbed. Flow is steady, discharge is even because drop is minimized and *elevator flights* are close-spaced. A single motor drives both breaker and elevator.

Stop profit-loss where it can be biggest – in your ice breaker. Any G-W representative can tell you about this new profit-building, corrosion-proof breaker, and recommend a unit size to fit your exact needs.

GIFFORD-WOOD CO.

Since 1814
Hudson, N. Y.

New York 17, N.Y. 420 Lexington Ave. | St. Louis 1, Mo. Railway Exchange Bldg. | Chicago 6, Ill. 565 W. Washington St.

Pacific Coast Representative: WESTERN ICE EQUIPMENT CO., 420 Market St., San Francisco 11, Calif.

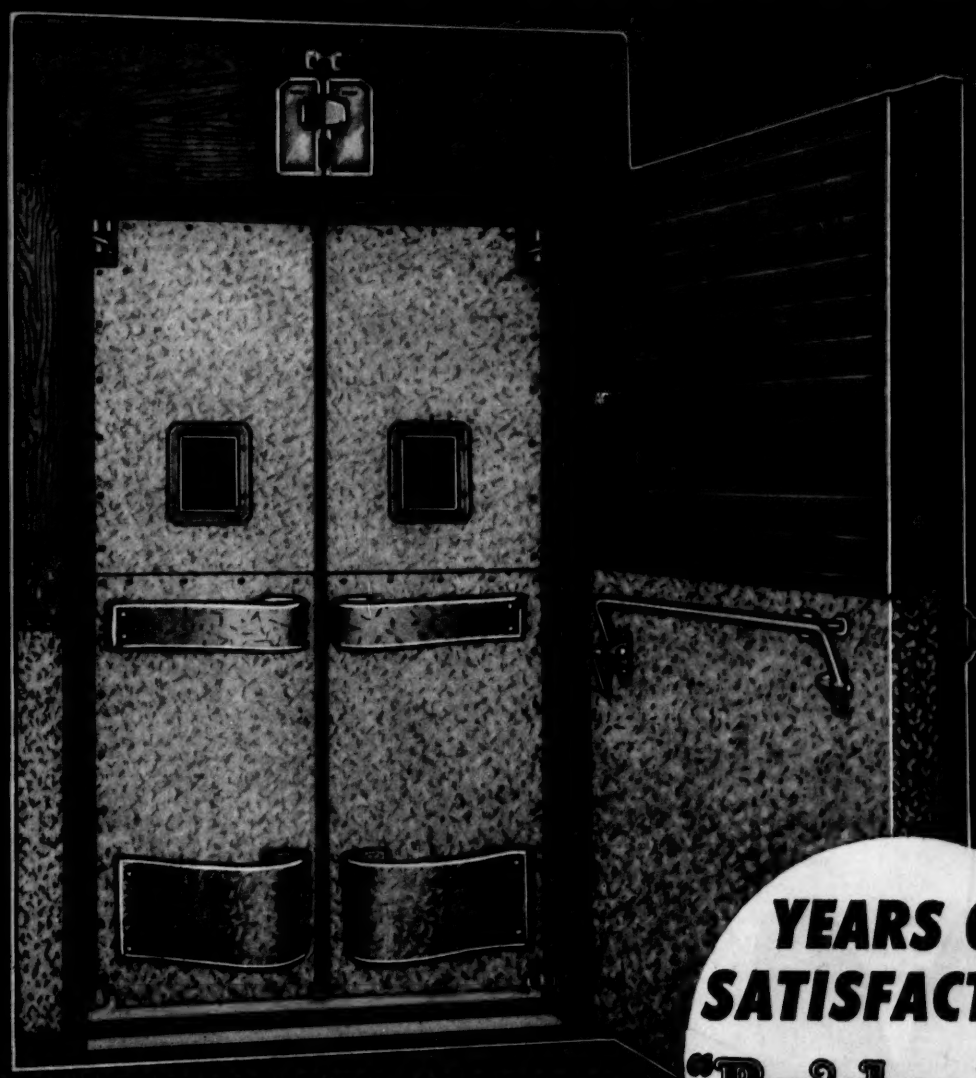
1447

SPECIFICATIONS

BREAKER	ELEVATOR
Stainless Clad Steel Plates	Aluminum Alloy Casing
Metallized Stainless Drum	Aluminum Alloy Flights
Chrome-Plated Picks	Stainless Steel Shafting
Chrome-Plated Bolts	Stainless Steel Sprockets
Shear Pin Protected Hubs	Chrome-Plated Steel Chain

Cuber | Tiering Machine | Conveyor | Breaker

HEADQUARTERS FOR ICE HANDLING, CUBING AND SIZING MACHINES AND TOOLS



VESTIBULE TYPE TRACK DOOR FOR

YEARS OF SATISFACTION

"Butcher Boy"

Quality Since 1885

WHY "BUTCHER BOY" DOORS ARE THE FINEST REFRIGERATOR DOORS BUILT!

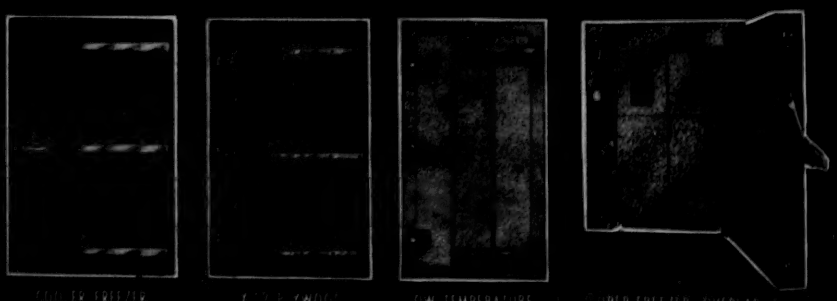
These Exclusive Features Furnished At No Extra Cost

DOOR STRUCTURE

HARDWARE

APPEARANCE

When a Man Thinks Twice ...He Makes Comparisons



LOW TEMPERATURE

SUPER FREEZER OVERLAP

BUTCHER BOY REFRIGERATOR DOOR CO. HARVARD, ILLINOIS

Find Out HOW YOU CAN GET PEAK PERFORMANCE on all FLOODED SYSTEMS with Sporlan LMC

Send for BULLETIN 60-15 Today... and Read the Facts!

SPECIFY

Sporlan

LMC

LEVEL MASTER CONTROL

Incorporating the Level Master Element on standard Sporlan thermostatic expansion valves.

FOR ALL FLOODED REFRIGERATION SYSTEMS

Made for Valve Types P-H-M-V-W-D-A

A Positive Liquid Level Control for Ammonia, Freon-12, and Freon-22 with all these features!

1. **Modulated Flow.** The Level-Master Control provides a modulated flow and maintains practically a static liquid level in the low side.
2. **No Moving Parts.** The insert bulb controlling the liquid level has no moving parts. Control does not operate through use of a mechanical float device of any kind.
3. **Simplified and Economical Installation.** The insert bulb can be placed directly in the shell, accumulator or liquid leg for direct contact with refrigerant. Existing float control systems can be easily and economically converted.
4. **Not Affected by Turbulence.** Regardless of any agitation which might occur in the low side, the effect on the Level-Master is merely that of striking a mean level and holding that level constant.
5. **Tight Closing.** Tight closing is assured by the spring action in the thermostatic expansion valve during shut down periods when the heater element is off and liquid refrigerant is in contact with the bulb.
6. **Proven Thermostatic Expansion Valve Performance.** On Ammonia, use of discharge tube on smaller capacities minimizes danger of seat errosion.

You Can Install SPORLAN PRODUCTS *with Confidence*

SPORLAN

SPORLAN VALVE COMPANY

7525 SUSSEX AVENUE ST. LOUIS 17, MO.

STAND-OUT

Irradiation of Foods—What Are the Prospects?

FOOD scientists have been looking with disfavor upon recently published claims regarding the status and prospects of irradiation for preserving foods. Especially startling to them was the following which appeared in the introduction to a nationally distributed business letter:

"Atomic radiation to preserve foods is making very rapid headway and threatens to start a revolution in food processing in a year or two. Housewives may be able to buy meats, vegetables, fruits, maybe even milk, that will keep completely fresh. . . Processors of canned and frozen foods are genuinely worried."

The Refrigeration Research Foundation in particular, has been outspoken in warning that much of this publicity is immature and that most of it comes from sources which do not understand the problems involved.

To present the views of food scientists, TRRF in a recent Bulletin published statements and results of interviews from a number of authorities including government researchers, frozen food packers, canners, meat packers, technological institutes, insulation engineers, research directors in various fields, and others.

The idea is not rejected by these scientists; on the contrary they accept it as of potential use for certain foods, and for others, a knowledge from experimentation and practice is obtained but its practical use seems to be a long way in the future. "Our ideas," says one, "are necessarily conservative, and we feel that there are a number of things that should be known before the process may be employed other than experimentally. For instance, information is needed as to the acute effects of food sterilized by such radiation, accomplished by the feeding of experimental animals, also more about the bio-chemistry of the food so treated."

Another contributes the suggestion that there is justifiable optimism for its use, for example to extend the storage life of potatoes and onions, and the refrigerator life of meats, to destroy insects in grains, and perhaps other uses. "It may be, as some think, possible and practical to irradiate some, perhaps even many of the canned foods we now sterilize by heat. At the moment there are heavy obstacles in the way of this and they will not be removed overnight."

The most practical and immediate application, according to another view, will be in the sterilization of pharmaceuticals and the surface treatment of fresh meats and vegetables to prolong storage in the fresh state.

Another says: "To our knowledge, no reliable research body will predict

(Continued on Page 53)

Industrial Refrigeration

formerly ICE AND REFRIGERATION

Now in its 64th Year of Publication

J. F. NICKERSON, FOUNDER

Vol. 129 August, 1955 Number 2

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The Cover:

Production room of new Philip Morris, Inc. plant, Louisville, Ky. Overhead is a typical conditioned air distribution duct system on all production floors. Air within ducts is 76° F and 54 percent relative humidity. Machines pictured actually fill paper tubes with ready-shredded tobacco to form completed cigarette. Humidity and temperature are not only critical in the successful operation of these units, but a very important factor in the entire product process. Read the detailed account in article starting on page 15. (Photo Courtesy of Philip Morris Inc.)

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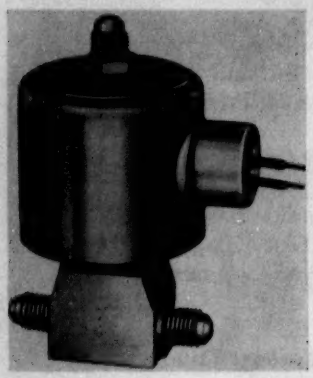
What's New

MACHINERY
APPLIANCES • PROCESSES

New Sporlan Valve Control

IN RESPONSE to field requests, the Sporlan Valve Company has modified its Type 171 solenoid pilot control to provide all ¼ inch SAE male flare connections. So that it may be more easily distinguished from the obsolete Type 171, the new control is designated as the Type 172.



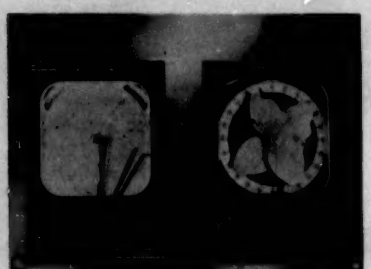
New Sporlan Valve Control No. 172

This control is used in place of large capacity solenoid valves for positive shut-off of liquid lines and is available for Freon-12, Freon-22, Carrene-7 and Methyl Chloride. The 172 control does not directly close the liquid line, but acts on the thermostatic expansion valve causing it to close.

Any number of thermostatic expansion valves, as large as those nominally rated at 50 tons on Freon-12, may be connected to one control.

Combination Time-Program Cycle-Controller

AN INSTRUMENT which combines in a compact two-case unit a two-pen, two-cam time-program controller with a cycle controller for timing up to eight operations has been announced by The Bristol Company, Waterbury, Conn. The cases can be mounted side by side or one above the other to suit particular space requirements. The instrument is useful in such applications as food cooking, plastics molding, rubber vulcanizing, environmental test cabinets, and in process control work.



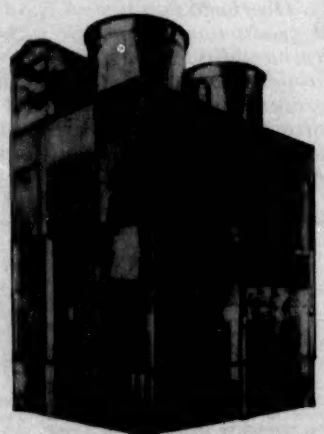
Bristol Time-Program Controller

The time-program controller can be used to control two variables such as temperature, humidity, pressure, or vacuum through any predetermined program of values by means of an aluminum cam cut to the proper shape. Each of the two cams is individually cut, and locked together in any desired time relationship to each other on a single hub. In this way, temperature can be controlled through one cycle of changing values while pressure is going through another cycle independently, but synchronized with the temperature.

The two cams can be changed as a unit in a matter of seconds, altering the program performed to meet varying requirements. The program controllers are available in on-off or proportional electric control, or pneumatic control in proportional, reset, or derivative modes. At the same time, such operations as the opening and closing of valves, switches, and dampers, and the starting and stopping of motors, pumps, and blowers can be automatically timed by the cycle controller. This controller operates up to eight high capacity air valves or electric switches, in any combination desired.

Ammonia Condenser

A NEW, 200-tons-refrigeration capacity Ammonia Condenser has been announced as an addition to the Niagara Blower line of high capacity industrial and commercial refrigeration installation of from ten to 400 tons in single units of convenient size.



New Niagara Blower Ammonia Condenser

The basic principle is that of evaporating sprayed water from the surface of condensing coils through which the refrigerant gas passes, extracting heat at the rate of 1000 btu per pound of water evaporated. The air stream enters at the top of the condensing section, is drawn downward thru the water sprays, over the condensing coils, and then turns upward to leave the unit through propeller-type fans at the top. This reverse direction air stream is a departure from previous practice and is a new, patented feature which increases the capacity of the unit and greatly reduces the outlay for electric power. The spray water falls into a tank at the base of the unit, from which it is recirculated, with a net water consumption of less than five percent of the water used by submerged coil type condensers of equal capacity. The equipment is protected from freezing.

In addition, the unit is equipped with the Niagara "Duo-Pass" precooling coil which removes the superheat from the refrigerant gas making it close to condensing temperature before it enters the sprayed, condensing section. Also, in the gas line, between the precooler and the condensing coil is located the Niagara "Oil-Out", at which point the oil vapor is condensed and is easily removed from the refrigerant. The Unit is compact, measuring approximately 8½ x 14 and 16 ft. in height, and weighs approximately 13 tons.

New Benders For Hard or Soft Tubing

NEW lever-type "Blue Dot" tube benders, which have design features enabling them to bend both hard and soft tubing, have been announced by The Imperial Brass Mfg. Co., Chicago, Ill. The new benders can be used for bending such hard-to-bend tubing as hard drawn copper, stainless steel and JIC steel tubing, the manufacturer reports. It is not necessary to use a clamp when bending to keep the tube from slipping. The "Blue Dot" benders take their name from a distinguishing blue dot on the fulcrum pin.

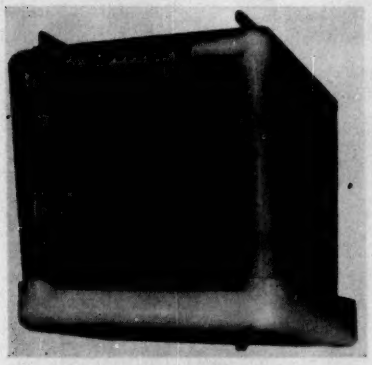
New lever-type tube bender announced by Imperial Brass Manufacturing Co.

Benders are of the open side type, which makes it possible to slip the bender over the tubing at the exact place the bend is desired. This makes them especially handy in hard-to-get-at places where tubing has one end connected. Bends can be made to any angle up to 180° without adjusting tubing or bender. The bending form is calibrated to show degree positions.

Each bender handles one size of tubing: there are benders for sizes from 3/16 in O.D. to ¾ in O.D. tubing (⅛ in to ⅝ in nominal tube sizes). Benders for ⅝ in and ¾ in O.D. tubing have long pipe handles. The new "Blue Dot" line of benders is described in Bulletin No. 3038, available from the manufacturer.

Angle-Air Unit Cooler

THE introduction of a cooling unit, the Angle-Air is announced by Tenney Engineering, Inc., engineers and manufacturers of refrigeration and environmental equipment Union, N. J. According to a company spokesman this new unit cooler will open a completely new era in refrigeration equipment design.



The New Tenney Unit Cooler

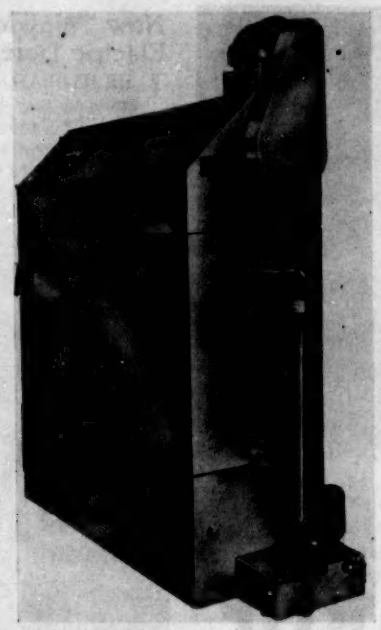
An outstanding contribution is a combination of easy-to-install and easy-to-service features. Only three steps are required for complete installation. 1. Hang template mount. 2. Slide unit into place on rail hangers. 3. Connect refrigerant, power and drain lines. These features allow for easy one man installations. Other features include suction line provision for simple expansion valve bulb location, integral heat exchanger, fins mechanically bonded on electro-tin plated copper tube, adjustable louvers and vibration mounted motor for quiet smooth operation.

Available in a wide range of capacities 4,000 - 40,000 Btu. Angle-Air Unit Coolers are "engineered" for every refrigeration job.

New Evaporative Condenser

A NEW and advanced Evaporative Condenser was unveiled by the Industrial Engineering Co., Chicago, in April. Built to rigid quality and performance standards, the IMECO Evaporative Condenser is said to meet the requirements set forth by the nations largest meat packers. Designed for long life and durability, all parts are made extra heavy to give added strength and life. To further assure trouble free operations, the pan, casing, coil, coil supports, fan wheels, fan housing, eliminators and pump strainers are, according to the manufacturer, all hot dip galvanized after fabrication; there are no raw edges exposed to corrosion.

Sixteen sizes ranging from 5 to 100 tons are available, permitting the use of an IMECO unit for most every application. The generous sized, well designed coil and the heavy duty large capacity blower wheels give capacity in excess of its ratings, it is claimed. Maintenance is quick and easy because of doors placed to allow access to spray nozzles and permit examination, cleaning or removal of



New Advanced design IMECO evaporative condenser manufactured to meet specifications of large meat packers

the eliminators. All sides are readily removable, permitting access to coil when necessary.

Water strainer is placed on the outside where it is immediately available for rapid cleaning. All bearings are on the outside where maintenance is simple. Non-corrosive stainless steel door hinges assure owners ease of opening and closing doors every time. A four-page color bulletin containing capacity data and correction factors, sample selection problem, and physical data is available.

Motorized Psychrometer

A NEW motorized psychrometer originally developed to meet the U.S. Government's need for a small, efficient and portable motorized weather instrument for use in accurately measuring temperature and relative humidity has been introduced by G M Manufacturing Company. The instrument is small enough to fit in an overcoat pocket and weighs 1½ pounds complete with three standard flashlight batteries.

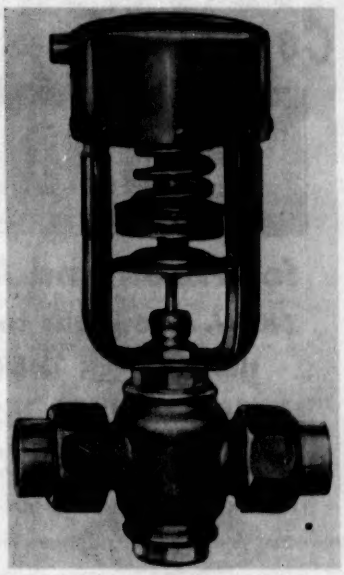
Its main advantages are its size, accuracy, ease of operation and quick response. Because of its design and size, measurements can now be taken in constricted spaces, ducts, display cases, etc. With intermittent daily usage, the batteries will last for many weeks. The instrument is designed to avoid thermometric errors due to radiation from sunlight or condition of heat from motor.

Motorized Psychrometer with slide rule.

The thermometers are carefully selected in matched pairs and are the easy-reading red mercury type. They are spring mounted and easily replaced. A reservoir is a component unit and it provides continuous wetting of the wick on the wet-bulb thermometer, insuring quick and more accurate reading. The special slide rule shown is used for rapidly determining the relative humidity at all temperatures. It will prove of help to engineers or technical men engaged in the fields of refrigeration, and air conditioning control and storage work.

All-Metal Motor Valve

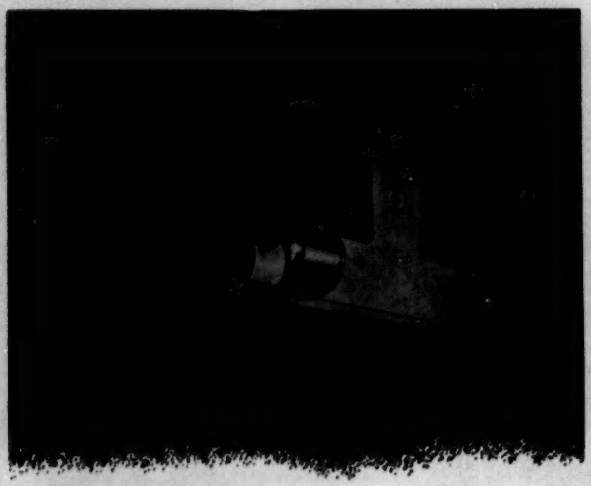
A BELLOWS-equipped all-metal motor valve with modulating characteristics has been developed by the Fulton Sylphon Division of Robertshaw-Fulton Controls Company for use with hydraulic and pneumatic control systems.



New All-Metal Motor Valve

The valve, equipped with a cadmium-plated steel spring and two-ply seamless metal bellows, is used to control the flow of steam, gas, oil, water and other fluids. It is employed as a final control element in pneumatic and hydraulic systems to maintain pressure, temperature or level in industrial vats, tanks, and processes.

According to a survey conducted by the company, the new control, called the No. 992-D bellows motor valve, is satisfactory for over 50 per cent of industrial applications where motor valves are used. The series 992-D possesses a linear valve movement and is available in sizes from ¼ inches to 4 inches and in a wide variety of valve types. It is supplied in either direct or reverse acting styles.



Announcing

EXTRA LARGE

Capacity...

THERMOBANK

for Freon and Ammonia

NOW...no job is too large for the KRAMER THERMOBANK

The only completely automatic system for freezing temperatures offering these extra large capacities. THERMOBANK requires no manual attention whatsoever.

Ceiling mounted, THERMOBANK takes no precious floor space. You can store products directly under the unit.

Can be used as an independent system or with an existing large system without affecting the operation of other evaporators.

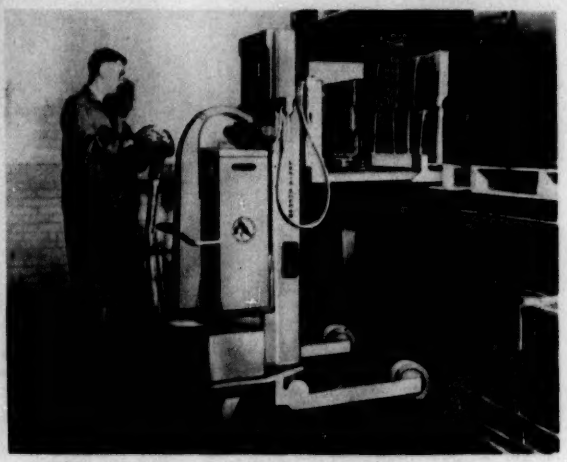
WRITE FOR BULLETIN TA249-F

KRAMER TRENTON CO.
Trenton 5, N.J.

New "Walkie" Type Electric Tiering Truck

THE HYDRAFORK, a new "walkie" type electric tiering truck equipped with hydraulically extendable forks, has been announced by Lewis-Shepard Products, Inc., Watertown, Mass.

With this new truck, 3000 lb. 48 inch long loads can be handled in aisles measuring only 67 inches. The HydraFork does not straddle loads; to pick up a load, the operator simply positions the truck, extends the forks into the pallet, and lifts load and pallet over the wheels and retracts it into the truck. To place load in storage racks, the operator extends the forks and load and drops the pallet into the empty space.



The New Lewis-Shepard HydraFork

Equipped with large 10 inch diameter by 5 inch face rubber tired load wheels, the HydraFork offers the best possible floor protection. This truck handles pallets of any width and can be used to reduce aisles in warehouses which have been laid out for counterbalanced fork trucks with no change required in the racks or pallets.

The HydraFork is available in either 2000 lb. or 3000 lb. capacity and has two speeds forward and reverse. The hydraulically actuated stroke of the forks is 24 inches. For additional savings in aisle space all controls; power lift and lowering, brake, horn and directional interlock are located in the handle head of the truck.

Crushed Ice Flows Through New Hose

A NEW ice-slinger hose recommended for loading trucks, refrigerator cars and ice compartments of ships with crushed ice has been announced by The B. F. Goodrich Company Industrial Products Division, Akron, Ohio.

A special hose tube, made of "Armorite," withstands constant pounding from jagged pieces of ice. Armorite is an abrasion-resistant rubber developed by B. F. Goodrich and said to outwear steel 20-to-1 in many applications.

The new hose operates as a suction hose up to full vacuum or as a discharge hose up to 30 pounds per square inch. Extra light and easy to handle, the hose is reinforced with patented Spiralock construction in which folds of fabric are locked around a spiral wire in the hose wall. The wire is not held rigidly between heavy, stiff multiple plies of fabric. The new hose is available in sizes 2, 2½, 3 and 4 inches.

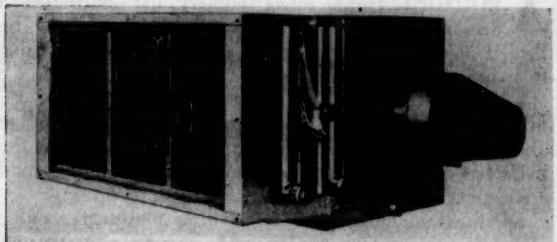
Relief Valves Approved

NEW increased capacity ratings for its more popular types of relief valves in sizes ½ inch through 1 inch for both Freon and similar refrigerants, and Ammonia is announced by the Henry Valve Co., Melrose Park, Ill. These valves are constructed in accordance with the requirements of the ASME Unfired Pressure Vessel Code and now carry the official marking symbol indicating National Board approval and capacity certification. In the opinion of E. Jones, chief engineer of the Henry Valve Company, this marking symbol also enables these valves to comply fully with the relief valve requirements of the ASA B9.1-1953 Refrigeration Code.

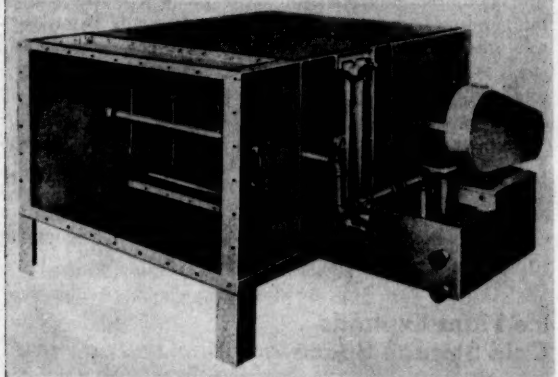
Cabinet-Type Air Conditioning Units

A NEW line of complete central-station, cabinet-type air conditioning units for industrial and commercial applications is now available from American Blower Corp., Detroit, Mich.

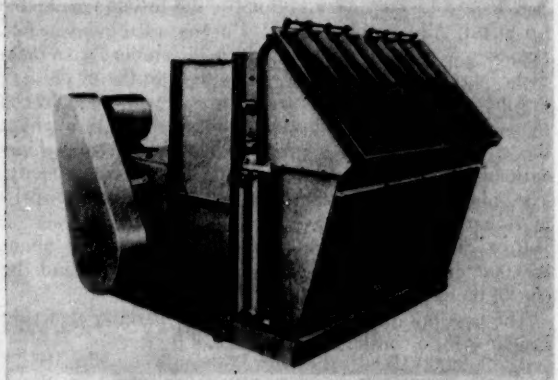
Main features of the line include compactness, simple installation, design flexibility and a wide capacity range in all types from 600 to 48,000 cu ft per minute.



TYPE A UNIT, ARRANGEMENT C



TYPE S SPRAYED COIL UNIT, ARRANGEMENT C



TYPE AB MULTI-ZONE CONDITIONER

New line of central-station, cabinet-type air conditioning units available from American Blower Corp.

Three basic types of units are included in the new line: (1) air conditioning units, (2) sprayed coil conditioner units and (3) multi-zone conditioner units. The air conditioning and sprayed coil conditioning units are available as either horizontal or vertical arrangements, both with horizontal air flow through the cooling coils. Multi-zone conditioner units are made in one arrangement for either horizontal or vertical air flow. All units have large volume, slow speed, air circulating fans. Cooling and dehumidifying can be done with chilled water, direct expanded refrigerant or brines. Heating is accomplished with steam or hot water. Air filtering is provided by cleanable or throw-away filters. Humidification can be had with either target-type water nozzles or sprayed coils. Manual or automatic controls can be provided in the new line for temperature, multi-zone or ventilation control.

When it's a question of new refrigeration coils, it's no time to speculate on dependability or to compromise on quality. And where it's a question of assuring efficient, uninterrupted operation and low maintenance throughout the years —

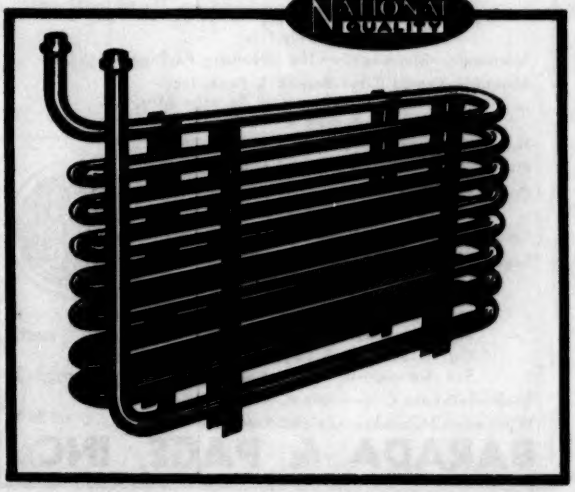
NATIONAL
REFRIGERATION
COILS

offer you the benefits of over 70 years' specialization in the pipe-bending field: experienced engineering and exact production, with smooth bends, perfect welds, and accurate measurements.

Whenever you need coils, write for our free tracing-chart which shows standard dimensions ready to fill in. It will simplify your specifications—whether for zig-zag or nested box or conical or round-flat or reducing coils.

NATIONAL PIPE BENDING COMPANY
162 RIVER STREET • NEW HAVEN, CONN.

Established 1883



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PRESS BRIEFS

New Canadian Warehouse Will Store Frozen Foods

A BOOMING frozen foods industry and sharp rise in demand for refrigerated warehouse space are reflected in construction of a million dollar warehouse due to open in Toronto, Canada.

The Ayer Storage warehouse will provide some 1.7 million cu. ft. of refrigerated space for freezing, storage and distribution of foods. In addition to storage space, the plant has a separate refrigerating equipment building and a one-story office building.

Facilities include a 280-ft. loading platform capable of handling 35 tractor-trailer trucks at a time. A freezing unit at the loading platform has been installed to prevent temperature change during transfer of foods from truck to storage room. The building, of reinforced concrete and steel, is encased with a six-inch layer of cork insulation—totaling 1,296,000 sq. ft. of one-inch sheets installed by 50 men working over a two-month period.

Temperature in the cold rooms will be kept at 0 deg. F., with a sharp-freeze room at 35 deg. below zero.

The warehouse was designed by D. N. McIntosh with construction by Richard and B. A. Ryan Ltd., Toronto. Canadian Ice Machine Co. installed the refrigerating equipment.

Ice Plant Expands Cold Storage Space

CONSTRUCTION will begin soon on a 50,000-cubic-foot cold storage addition to the Albuquerque Ice Co. plant, Albuquerque, N. M. Purpose of the expansion, manager Walter T. Elliott said, is to handle "a tremendous increase in frozen foods coming into the city.

Albuquerque Ice acts as a storage point for frozen foods before their distribution to retail stores throughout the city. Cold storage space has increased from a four-carload capacity five years ago to a 20-carload capacity. The addition will represent an increased capacity of 10 more carloads.

Cost of expansion for frozen foods has been about $50,000 during the past five years, Elliott said, and the cost of the new addition will be about $30,000.

The new building will be a one-story masonry structure insulated for a constant temperature of 0 F.

Foods Plant Adds Storage

START of construction on a cold storage plant has been announced by the Gerber Baby Foods Co., Rochester, N. Y. Completion is expected by early Fall. The new building, 138 by 131 feet, will be of concrete blocks faced with brick. Besides freezer storage rooms, it will have fruit and vegetable control temperature rooms, engineering offices and a laundry for employe uniforms. The new structure will be linked to the fruit ripening building erected last year.

Missouri Pacific Buys Ice Dock

THE MISSOURI Pacific Railroad has been authorized to purchase ice dock facilities at Settegast Yard, Houston, Texas, which the railroad had been leasing from Central Power & Light Company. The purchase price, it was reported, was $38,571.

Evanston Department Store Completes Air Conditioning

WIEBOLDT Stores, Inc., of Chicago, late in June completed air conditioning of its Evanston store. Customer space, store offices and other employee operational areas have been included in the conditioned zones.

Equipment is a 900 horsepower Carrier Corporation centrifugal water chilling unit. Sweet water chilled to 45 F is circulated by a 75-hp Peerless pump to Carrier spray-coil units installed in existing ventilation casing. Existing fans were also utilized. The system was sized for anticipated increases in lighting loads, one of the major considerations in connection with designing such systems.

Although Evanston city water was guaranteed the firm by city officials for the next three years, the owner and contractor decided on a Marley cooling tower. Evanston has given some consideration to water conservation measures which may be imposed in the near future. Another factor which influenced the tower purchase was a storm sewerage problem. Underground weirs or catch basins had to be installed beneath the department store parking lot to catch heavy downpours in that area and release them gradually to the city's storm sewer system. Should the air conditioning condensing water be taken from the city mains and dumped to the sewerage system it may have caused shut-down of the air condition systems during heavy thunder storms.

The tower is a two fan arrangement that will handle condensing water at 97 F on and 87 F off. The casing is $\frac{3}{8}$-inch corregated cement asbestos.

Plan To Air Condition Pennsylvania Capitol

GOVERNOR LEADER signed (June 10) into Pennsylvania law a bill appropriating $400,000 to complete a central air conditioning system in the main State Capitol Building. During the past several years, some $3,000,000 has been spent in renovating the plumbing and electrical systems and for installation of a hot-cold network of pipes and radiators to handle the combined job of heating and cooling the building.

Previous legislation had eliminated the allocation for the central cooling plant, which was not needed pending completion of the distribution facilities which circulate hot water in winter and cold water in summer.

Fire Destroys Million Dollar Warehouse

FIRE almost completely destroyed the $1,000,000 warehouse of the Underwood Fruit Packing and Warehouse Company which stretches for a quarter of a mile along the Evergreen Highway, Underwood, Wash. Driven by a 15 to 20-mile wind, the flames raced through the 1400 by 40-foot building. The warehouse had a capacity of 225,000 boxes of fruit, but none was stored in it at the time of the fire. The blaze started around midnight. Before the firemen arrived, the flames had raced through a major part of the building, fed by sawdust insulation in the walls of the refrigerated section. Cause was not yet determined.

Florida Proposes Frozen Food Regulations

THE Florida State Department of Agriculture is reported to be drafting a set of proposed regulations for frozen foods, covering transit and handling. The new regulations, it is expected, will be in the form of an administrative ruling under existing law rather than a piece of new legislation.

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In the Spotlight

TOBACCO from the field to the finished cigarette offers another very interesting example of what can be done by industrial air conditioning in the control of color, texture, and flavor. In the processing of tobacco, control over moisture regain of chemical and bio-chemical reactions are involved, and only through close atmospheric control can the best qualities of leaf be developed. The author, an engineer for a firm which specializes in textile, tobacco, and such fields, relates how the cigarette is produced, then discusses design and maintenance considerations, starting on page 13.

THE ICE SKATING Season in Hamtramck, Michigan has been extended with facilities that can be used throughout the entire fall and winter. The new Beltemp ice rink is completely automatic and permits ice to be maintained at all times. See story and pictures on page 18.

NEW STORAGE capacity for frozen foods has been added by The Continental Freezers, Chicago. This plant, one of the pioneers in one-story cold storage construction, has completed another major addition for low temperature storage, break-up rooms and other service facilities. It has many new and original features fully described and illustrated in the article starting on page 19.

AS A FIRE Safety measure, four 1000-gallon tanks were installed on the roof of a cold storage building of the U S N Depot, Seattle, to absorb ammonia gas from the refrigerating equipment. For additional details, and a picture, see article on page 24.

ICE SALES in 1954 amounted to 30,183,785 tons, and of processed ice 5,033,176 tons, a decline in overall tonnage, but an increase in processed ice sales from 1953. Percentage of companies providing processed ice service showed a considerable increase. Additional details of this annual survey, conducted by the National Association of Ice Industries are included in the article on page 25.

AIR CONDITIONING was installed in a Virginia Trust Company where it was necessary to overcome the problem of exposed ductwork. How this was accomplished, and details of the installation are given in the illustrated article on page 26.

BASIC ELECTRIC CONTROLS is continued in the "Practical Refrigerating Engineer" on page 27. Push-button station operation is explained. Author Howard Wolfberg sets up the line drawing of a control circuit as the designer would indicate it, then shows how the detailed circuit is drawn from that for the benefit of the electrician. The operating engineer should understand the line drawing, as it indicates functions of the control elements.

EDUCATIONAL plant visits will be one of the features offered at the Annual NAPRE Convention to be held at Los Angeles, November 8-10. Included in the article starting on page 40 are descriptions and illustrations of many unique and modern refrigerating installations in that area many of which the members of the convention will have an opportunity of visiting.

FROZEN ORANGE juice concentrate will be marketed under its own label by A & P Food Stores, if present plans are carried through, according to a news announcement.

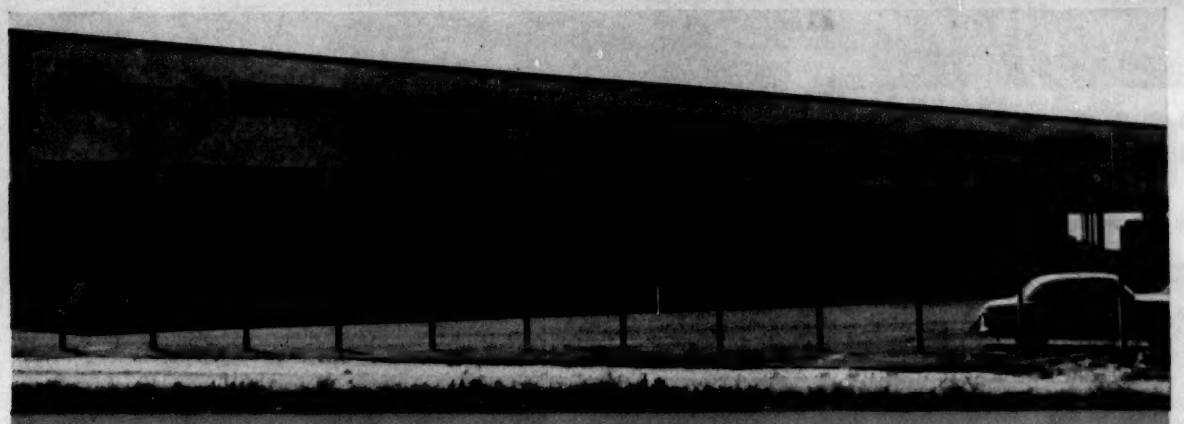
RETAIL SALES of central residential air conditioning equipment was approximately double those for the same period last year, according to Cloud Wampler, chairman and president of Carrier Corp. Mr. Wampler increased his estimates of installations during the present twelve month period to 150,000 as against 125,000 forecast only a few months ago. He also predicted that by the end of next year about 3,000,000 homes will be equipped with complete or partial air conditioning.

Worker Bums A Ride In Refrigerator Car

A CHICAGO stockyard laborer, who climbed aboard a freight train he thought would take him to Texas, was found in a refrigerated boxcar in Philadelphia, in which he had been locked for 5½ days without food and water. Manuel Ramirez, 28, said he recently had been laid off from his Chicago stockyard job. When his money dwindled to one dollar, he decided to hop a freight back to Laredo, Tex., where his family lives. So he climbed into a refrigerated boxcar packed with sheep hides at a Chicago siding, thinking the train was going to Texas and made himself comfortable for the long ride home.

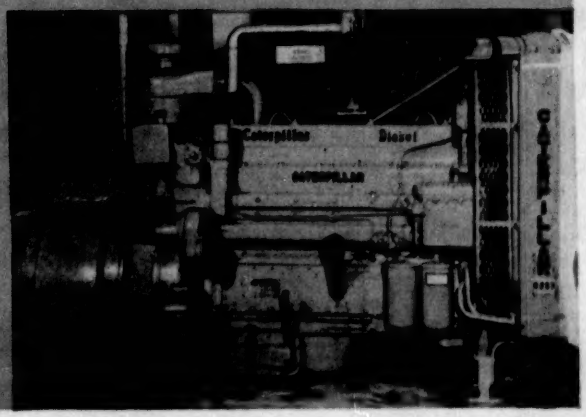
While he hid among the hides, a railroad worker sealed the car and the temperature inside dropped to about 50 F as the train started off. After numerous switches onto sidings and other delays, the refrigerated car arrived Tuesday evening at a Philadelphia leather processing plant siding.

Workers unloading the sheepskins found Ramirez unconscious under his overcoat. They thought him dead and called the police. Two patrolmen carried the "body" from the car to take it to the morgue. But Ramirez' eyes popped open. At Episcopal hospital he was given water and soft food. Hospital physicians said he was suffering from malnutrition and dehydration but appeared in good shape otherwise.



Power failure doesn't worry Plantation

...CAT* Electric Sets are on guard



A power failure, no matter what its cause, can be disastrous to a cold storage plant. That's why Plantation Cold Storage of Uleta, Fla., owned by Plantation Foods Corporation, has two Caterpillar Electric Sets standing by—a D337 and a D326.

With dependable Caterpillar Electric Sets, Plantation can forget about the loss of money and customer good will that a power failure could cause. Such sets, when equipped with automatic starting, spring into action immediately, and they will do so without human attention.

You get this protection in a compact, low-cost package. Cat Electric Sets require little space and they're easy to install. The operation of these units is simple. They require neither complicated switch gear nor a trained electrician.

There are 12 sizes of Caterpillar Electric Sets up to 300 KW. There is a size that fits your needs exactly.

Your Caterpillar Dealer knows electric sets. He will make complete installation for you or, if you wish, show you how to do it. And he'll furnish prompt, reliable service.

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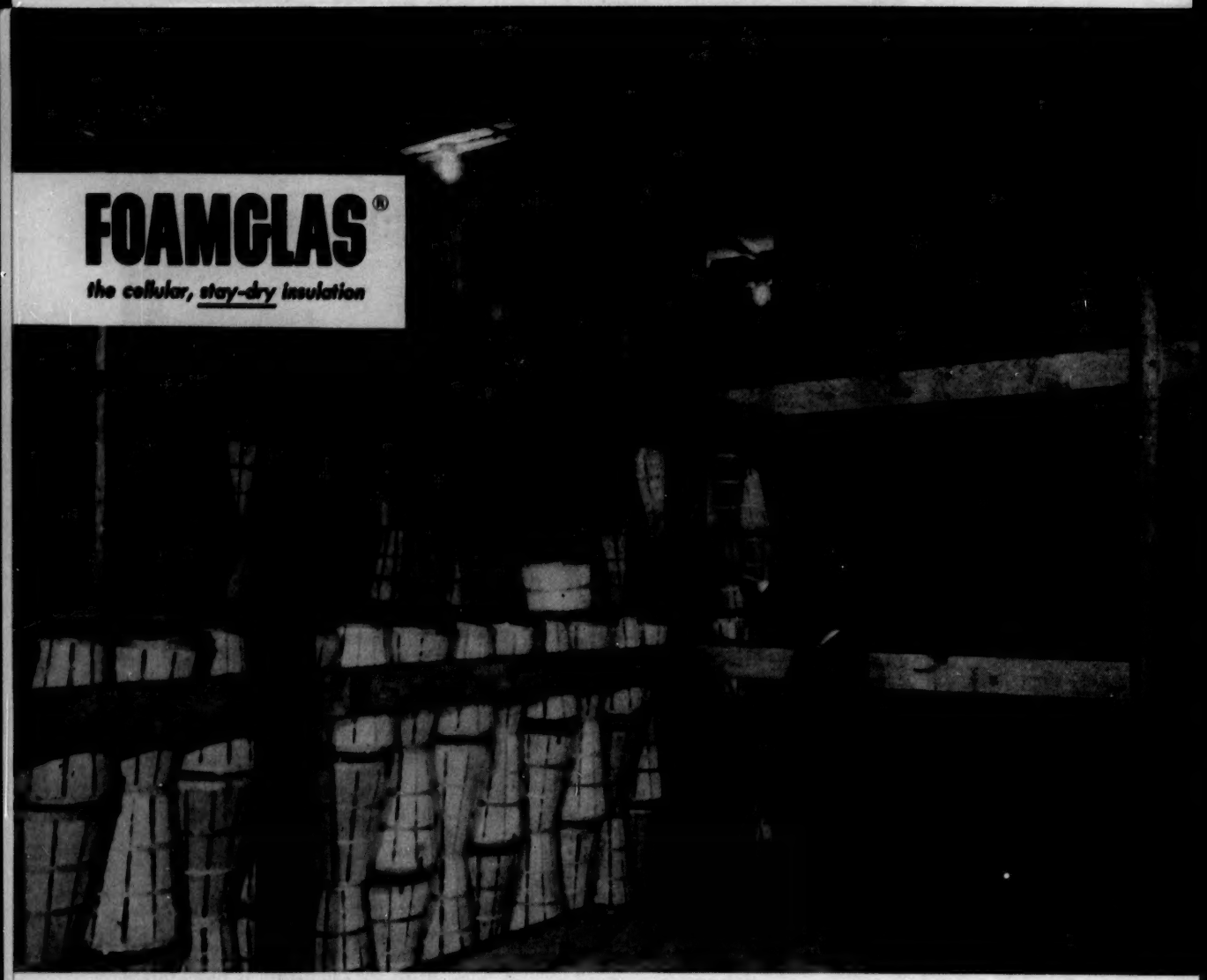


"Our sweet potatoes can't spoil because FOAMGLAS insulation stays dry"

says John J. Ordille, Manager, South Jersey Produce Cooperative Assn., Inc., East Vineland, N. J.

"Proper curing and storage of perishable sweet potatoes requires exact temperature and humidity control," relates John J. Ordille, Manager, South Jersey Produce Cooperative Assn., Inc., East Vineland, N.J. "Even the heat gain through the roof on a bright winter day could be damaging . . . and condensation inside the warehouse might be disastrous. We rely on FOAMGLAS to prevent such damage to our crops. Here's why:

"FOAMGLAS can't absorb the moisture that cuts the efficiency of ordinary insulations. That means constant, long-lasting insulating performance for unvarying temperature-humidity control and freedom from condensation."

Mr. Ordille concludes: "Our choice of FOAMGLAS proved a wise one during the past storing season. It was a big factor in keeping our crop in perfect condition."

You, too, will reap outstanding benefits when you insulate with FOAMGLAS. It *stays dry*, is fireproof, light in weight, yet strong and rigid. Get the full story! Send today for a sample and your choice of booklets describing the use of FOAMGLAS to insulate: 1) roofs, ceilings, walls and floors; 2) cold storage space; or 3) piping, tanks and other equipment. Write indicating your specific interest.

Pittsburgh Corning Corporation
Dept. T-85, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

Architect: J. A. Fletcher, Vineland, N. J.
Roofer: Harold E. Smith, Vineland, N. J.

Design and Maintenance Considerations For Cigarette Plant Air Conditioning

An Insight to Various Manufacturing Processes, and Air Quantities, Temperatures, Humidities Desired, Equipment Upkeep, Personnel Training.

FREDERICK BOXALL
Engineer
The Bahnson Company
Winston-Salem, N. C.

MODERN economical production of uniform quality cigarettes is impossible without reliable air conditioning and control of humidity for each major operation in the cigarette manufacture. The exact size and capacity of such conditioning equipment will depend upon the size and insulation of the building, and the maximum variation in local weather conditions. While it may not be applicable in all cases, a general outline of air conditioning required is given here, together with the actual cigarette manufacturing process.

Manufacturing Steps

More important steps in the manufacture of a modern cigarette, from receipt of tobacco at the plant to shipping of the finished product in carton cases, includes moistening, threshing and stemming, drying, bulk storage, cutting and casing, cut storage, cigarette making and packing.

There is no air conditioning applied to moistening rooms. Tobacco is delivered to this point in hogsheads which are barrel shaped containers approximately 4 ft. diam. x 4½ ft. high, carrying about 1000 lbs. of tobacco. Moistening is accomplished with a vacuum system in a Guardite unit. The hogshead is placed in the unit and subjected to high temperatures and high relative humidities. This process requires approximately 45 minutes. Approximately 14 percent water by weight is added to the tobacco.

The advantage of this arrangement is that the hogsheads may be opened after moistening without damaging the tobacco. It has been found that this treatment improves and sweetens the tobacco. Also, its bright color will be preserved in the cigarette.

Threshing and Stemming

For threshing and stemming operations in summer, conditions are maintained between 75 and 85 F., and 60 to 70 percent relative humidity. Under winter conditions, heat is required for 80 F. and humidity will be the same between 60 and 70 percent. This process is the removal of the leaf from the stems or the midrib. It is accomplished with the passage of the leaf through a threshing (cutting) machine, onto a conveyor and into an air stream where the leaf is segregated from the stems. The stems fall by sheer weight through the controlled air stream. This type of threshing device uses approximately 6,000 cfm. of conditioned air. It must be borne in mind that this amount of air is thrown to atmosphere, and therefore, must be replaced. Quite a load in itself.

Stemmed tobacco drying areas are not conditioned. However, air has to be brought into the rooms since each dryer uses approximately 76,000 cfm. Therefore, the air must be brought in from the outside and preheated before winter use.

Stripped (stemmed) tobacco is stored following drying. The bulk storage of strips should be maintained between 75-85 F., and 65-75 percent R.H. The material usually stays in storage for 72 hours.

Cutting and Casing Process

Conditions in the cutting and casing room should be maintained at 75-80 F., and from 60-65 percent R.H. These requirements don't appear as a difficult engineering factor to cope with until the process is examined. Strips of tobacco are brought from storage and passed through casing machines. Here flavor and steam are added, bringing the temperature of the tobacco to approximately 110 F., with an addition of 18 to 19 percent moisture. These casing machines exhaust between 1000 and 1500 cfm.

From casing operations, the tobacco passes into the cutting machines

Fig. 1 — (Above) Control mechanism on a dehumidfying air washer section in Louisville Philip Morris plant checked by engineer. This unit conditions air for 45,000 sq. ft. of tobacco storage to 76° F and 60% RH.

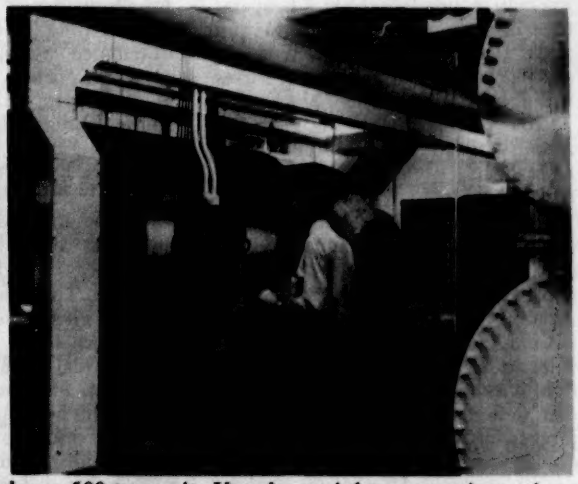
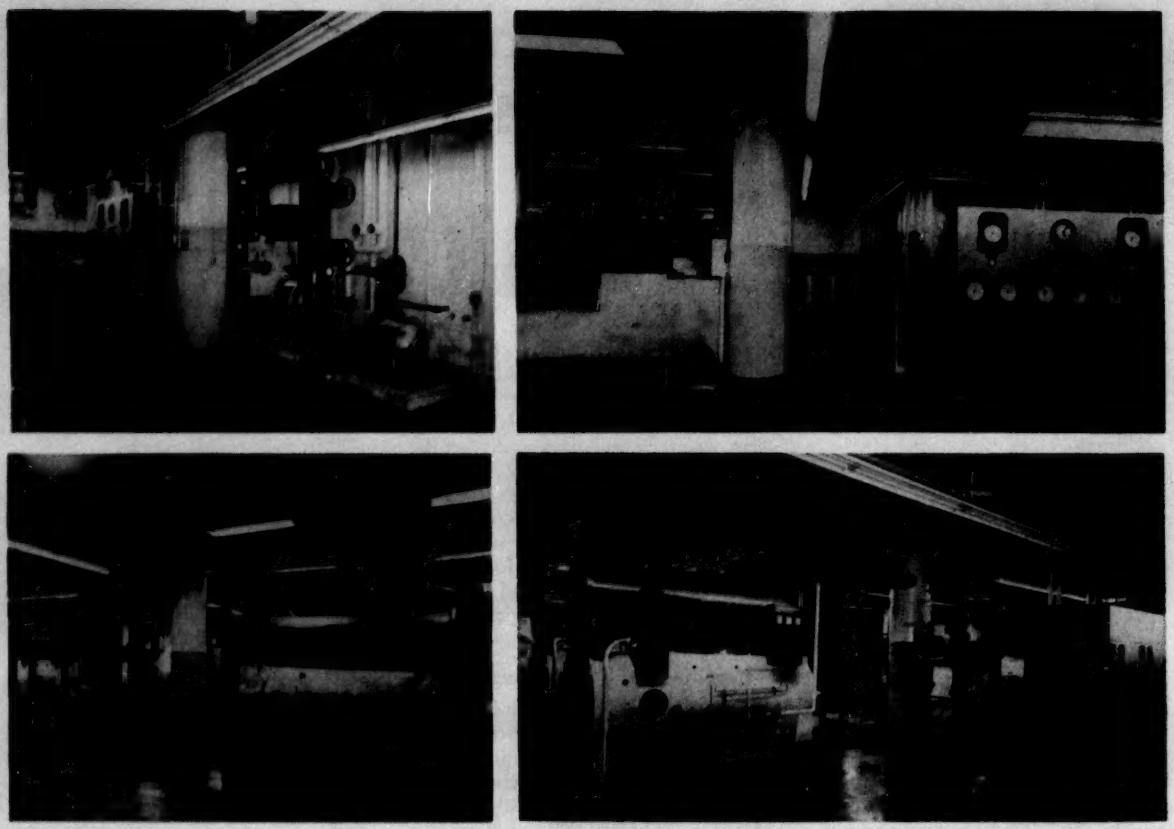


Fig. 2 — (Right) Engineer C. E. Stapp, Philip Morris, Inc., checks on hourly readings of pressures and temperatures. Unit is a 300-ton York centrifugal-chiller. Plant has also a 500-ton unit. Vessels at right are portions of a 100-ton Trane Turbo-Vacuum unit.



Engine room views at Liggett & Myers Tobacco Co., Richmond, Va.: Fig. 3 — (Upper left) Chilled water pumps which take their suction from large insulated gravity return water tank in right background. At left, the control panel is visible and, mounted on the post, the pH recorder for the chilled water circuits. Fig. 4 (Upper right) One of two 720-ton Carrier Centrifugal on the left and the Buensod-Stacey, Inc. constructed control board at the right. Three small tanks in center background are part of water treatment system for maintaining both chilled and condenser waters in desired state. Fig. 5 (Lower left) — One of the 720-ton condenser chillers, with condenser water service pumps to left of column. Behind column is a unit conditioner for cooling machinery room. Fig. 6 (Lower right) — At left, two 100-ton Trane Turbo-vacuum machines. Motor starters for 720-ton units at extreme right

where the strips of tobacco are shredded into thin narrow ribbons. This is accomplished by a series of knife blades under which a layer of tobacco is fed. After passing through the cutters, this tobacco at a temperature of approximately 100° F. and with a moisture content of 18-19 percent passes into a dryer. It leaves this dryer at aproximately 114 F., and 12-15 percent moisture content. Again, this dryer is equipped with an exhaust, handling between 2500 and 3000 cfm.

In the next state, tobacco passes through coolers in which the air stream reduces temperature again to approximately 100° F., retaining the moisture content between 12 and 14 percent. Since this cooler functions with an air current and air circulation, it exhausts approximately 6,000 cfm. to atmosphere. From the cooling process, the tobacco proceeds to a top dressing drum where ½ percent of moisture is added to insure against case hardening.

Next step in the manufacturing process is the cut tobacco storage, where conditions are 77-80 F., and 60-65 percent R.H. This is an ageing process in which the tobacco stays for approximately 72 hours, to permit the seasoning juices to become evenly distributed throughout the entire mass. This allows the tobacco juices to unite with the flavoring juices, and conditions the tobacco for the next operation.

Cigarette Making Conditions

Temperature and humidity requirements for actual cigarette manufacturing are 76-78 F., and 60-65 percent R.H. This point of the process is actually where the cut tobacco is fed into paper tubes to form cigarettes (See Cover). When the tobacco is too moist, more tobacco than is desirable will be fed into the paper tube and the result is a hard cigarette which will not smoke well. If the tobacco is too dry, less tobacco than is required is used. The result is a soft cigarette which will not keep its shape. The tobacco will fall out.

It has been found from experience that if the temperature is from ½ to 2 F. lower in the manufacturing area than has been maintained in the cut storage, there will be case-hardening effect which will make the tobacco firm and operate a lot easier. Air-conditioning factors involved in regulation of climate to packing areas are 76-78 F., and 60 to 65 percent R.H. In this manufacturing step, the cigarettes are wrapped in packages which are in turn sealed in Cellophane and placed in cartons, and the cartons in cardboard boxes. From this point, they pass on to the shipping department, away from strategic or critical controlled areas.

Design Factors Considered In Plant Air Conditioning

Fortunately, it has been found that the temperatures and relative humidities required for the manufacture of cigarettes, and processing of the same,

falls within the human comfort zone. Therefore, the conditions required for efficient manufacture tend toward the efficiency of employees together with the development of better workmanship and less cost of production.

In rooms where air conditioning is not required such as drying processes, it is found necessary to introduce large quantities of air since the dryers themselves use this volume and discharge to atmosphere. In the operation of the dryer, personnel function at both ends; therefore, the air should be introduced at this point. If necessary, it should be ducted over to this area. There is a certain psychological effect involved since the employees will feel more comfortable with air in motion in the working area. This outside air should be brought in through units that have tempering coils because the same quantity of air will be used during the winter months as in the summer. It should be introduced into this area at a uniform temperature.

In preparation for stripping, tobacco undergoes a softening operation. It is automatically heated, moistened and then cooled. Therefore, it is absolutely essential that the control of chemical and biological *moisture regain* reactions be applied to tobacco processing. Further, it should be borne in mind that exact temperature and humidity conditions to be maintained, are usually trade secrets as they affect the desired finished product. Here again, however, there are certain critical points which have to be taken into consideration; namely, in the drying process, when tobacco reaches a point beyond 120° F., fermentation increases very rapidly and bacteria multiplies extremely fast above this condition. Therefore, very close control must be maintained to keep the drying process below these temperatures.

Latent Heat Load Estimates

In the manufacturing process of hygroscopic materials such as tobacco, the temperature and relative humidity have a marked influence upon the rate of production, upon the weight, strength, appearance and general quality of the product. The moisture content of the materials having a vegetable origin come to equilibrium with the moisture of the surrounding air. This moisture content, when expressed as a percentage of the bone dry weight, is known as *regain. Standard regains* are fixed in the trade and are the fundamental basis for the control of certain physical quantities of the material during manufacture (see Table 1).

TABLE 1 — MOISTURE OF REGAIN FOR CIGARETTES — STANDARDS, AS FIXED BY THE MANUFACTURING TRADE — BASED ON THE STANDARD TEMPERATURE, 75 F

Area R. H.	equals	Moisture % *
10%		5.4
20%		8.6
30%		11.0
40%		13.3
50%		16.0
60%		19.5
70%		25.0
80%		33.5
90%		50.0

*Moisture content is expressed in % of dry weight of the tobacco substance.

The effective temperature as compared to the relative humidity is comparatively unimportant. Over-sudden changes in the temperature cause a slight change in regain. When the relative humidity remains stationary, changes in temperature do, however, effect the rate of absorption or drying, although this property generally varies with the nature of the materials and its thickness and density.

When hygroscopic materials absorb moisture from the surrounding air, they deliver to the air sensible heat equivalent to the latent heat released by the moisture to the material. This amount of heat should be included in the load estimate.

Prefers Dew-Point Controls

In order to obtain the closest possible control over conditions in a cigarette process room, it has been found that dew-point controls gives the greatest advantage. This is accomplished in two ways: with the thermal element of the sensitive instrument exposed to the air leaving the air washer, or by maintaining a constant water temperature. In the latter, the sensitive element is immersed in the circulated water of the washer tank. Water is maintained at a definite temperature and for the conditions involved in cigarette manufacture, is approximately 60 F. It should be cautioned that the best controls are none too good to maintain the critical conditions required for this process.

Since cigarette manufacturers are very deeply involved with a rapidly growing industry, all equipment should be designed to operate at minimum velocities in order that any immediate growth can be extended by speeding up equipment to maximum velocities.

In other words, an air washer — a primary piece of equipment in tobacco air conditioning — which has a range from 500 to 650 fpm. should be designed to take care of the present load at its lowest velocity; namely, 500 fpm. Then, when changes of machinery occur, the washer need only be stretched to its maximum velocity to obtain full efficiency, and at the same time cope with the increased load that has been put into the manufacturing area. This same situation applies to fans, pumps and refrigeration equipment. Thus, an increase of 20 percent of the heat load in the manufacturing area would not require a complete revamping of all the air conditioning equipment.

Cites Man-power Replacement In Horsepower Equivalents

The general tendency in industry today is to eliminate man-power. It has been found that a good "rule-of-thumb" method for such an estimate, can be based upon the fact that the elimination of one man would be equivalent to the addition of hp. An estimator must realize then that the Btu difference in load between one man working and 1 hp at work can make tremendous difference to requirements of air conditioning equipment.

Selection of equipment to accomplish conditions required in the manufacturing areas requires serious consideration of a number of points. First, it must accomplish the conditions required in the manufacturing area; and, secondly, it must be of such a design that maintenance can be simplified to a minimum number of man hours per week to prevent a shutdown.

Since the major portion of air conditioning for the cigarette manufacturing itself requires uniform temperatures and humidities, it has been found that heaters placed in the supply ductwork give the best reheat control.

Central Station Systems This Industry Preference

It has been proven over a period of years that the central station air conditioning design using air washers has been the most practical approach. However, this type of equipment does accumulate a lot of dust and dirt, together with bacteria and algae. Therefore, the quantities of air involved can present a severe maintenance problem.

To reduce this overhead, and since the cleaner the equipment is kept the better the production results, air washers are constructed entirely of stainless steel. This material has been the easiest to maintain, keeps a lot cleaner over longer periods of time, and can be expected to operate for an indefinite life span. Stainless steel is

also used for the eliminators, the angles supporting them, the baffles, the center supports, the side casing, and the tanks. In a multi-story building, it is advisable to have metal tanks since they are more flexible with the motion of the building and will not tend to crack or open up with the strain of building motion.

In the design of air washer equipment, headers for the sprays should be brought in at the top of the washer and the standpipes suspended. This will eliminate traffic over the inlet piping by the maintenance personnel while cleaning the washers. If it becomes necessary that the height of the washer be extended over ten feet, then a platform can be installed at the high elevation to permit maintenance men easy access to the cleaning of nozzles. Placing ladders inside an air washer creates a very hazardous and dangerous occupation.

In order to acquire water temperature conditions for maintaining constant dew-point temperature, refrigeration is necessary as a part of the design equipment. Centrifugal refrigeration equipment is chosen for large installations. Again in selecting this equipment, consideration should be given for future developments. The machine should be selected so that a change of speed would give the desired factor of safety for the unexpected addition.

Buy Increased Capacity For Future Developments

In one installation recently (during the last five years), the load figured approximately 1000 tons of refrigeration and the plant purchased a machine with a capacity of 1250 tons. They are using this machine up to its extreme limit today and are desirous of increasing its capacity now to approximately 1500 tons. This has been the growth of that particular plant over a five-year period, due entirely to changes in manufacturing equipment, the introduction of electronic controls, etc., that add heat load to a manufacturing area.

Design of a refrigeration room should be made with a minimum of valves to reduce mechanical maintenance as much as possible. Further, equipment should be located in the building for the easy access and removal of cooler and condenser heads. This operation is necessary on an annual basis. If accessibility is left to the usual maintenance crew with blocks and tackles, etc., it becomes a hazardous operation since these heads weigh anywhere up to 500 pounds. The maintenance problem should be considered in the development of all equipment layouts in order that overhaul problems can be reduced to a minimum for expediency.

Cooling towers should be of the forced draft type. All pumps should be of the split case type, which have easy access for cleaning purposes. Since all this equipment involves water in circulation, algae and bacteria are prevalent; especially so around tobacco factories. Therefore, before any plant is placed into complete operation, water treatment should be given full consideration.

Rugged Maintenance Program

Air conditioning equipment is not going to work any better than the service it receives. In order to accomplish the job, it is absolutely essential that this equipment be kept clean at all times. Air introduced from the outside should be filtered. The degree of filtering will have to be determined from the general location. Whatever type of installation is made, electrostatic, oil or dry filters, there is a maintenance problem that much be correlated with the maintenance group.

Water screens on washers will have to be cleaned on a daily basis. Washers should be equipped with a dual set of screens; the used screen can be removed and permitted to dry until the dust and dirt can be brushed from the surface, or a water spray of high velocity can be used to wash this dirt off and down the drains. Thus, sufficient drains should be placed in any apparatus room for this disposal of excess water. Automatically washed strainers are available. One type of automatic strainer self-washes the dirt to waste from the suction screen. It is unnecessary to maintain these screens.

Sump Tanks Cleaned on Weekly Basis

Sump tanks of air washers have to be cleaned out on a weekly basis. If the tanks are constructed of stainless steel, there is no problem of scuffing the bottom or scratching the surfaces which would result in a breakdown of the seal between metal and water. When steel tanks are used, there is always a danger of corrosion. It becomes necessary after short intervals to sandblast or wire-brush the tank, and repaint the whole thing. It is impossible to keep scuff marks off of painted surfaces since it is necessary to get inside the washers to remove the nozzles periodically for cleaning.

Eliminators and baffles are sprayed down on a weekly basis to eliminate all dust particles that may adhere to the surface. With stainless steel equipment, this operation can be reduced considerably. Corrosion of other materials may require the removal of the eliminators. To remove one set of eliminators requires 16 man hours for the average washer. A hinged eliminator design greatly simplifies this operation.

Fan maintenance, other than greasing and oiling, amounts to painting on an annual basis. If the prime coat is put on properly in the first place, it is only necessary to add touch-ups should any break-throughs occur. However, it may be necessary every five years to strip the fan down, wire brush and renew base paint once again.

Washer Insulation Materials

It has been standard practice for many years to place cork insulation below an air washer. If the life expectancy of this air washer is to be extended, it is suggested that "Foamglas" insulation be placed below the washers. This material does not deteriorate from water which may be flooded over these floors. Foamglas set in an asphalt base with edges sealed is just as efficient.

As previously noted, close consideration should be given to valving. Excessive valves increase the maintenance problem and reduce efficiency of operation. Their reduction in numbers also affords a corresponding reduction in the maintenance of cork insulation over a period of years. Here again, with the header piping elevated and the traffic over it eliminated, ordinary care can maintain this cork insulation for long periods of time.

Other component parts in a central station layout can remain standard; namely, the dampers can be made of painted steel, louvers can be galvanized, return air screens can be galvanized, and the casing between the air washer discharge and the fan suction can be galvanized casing. The fan itself can be constructed of steel, painted in accordance with the accepted practice for the particular application such as Vinsynite, Rubalt, Metalast, etc. However, all of these fans should be designed with access doors located in such a manner that they are easy for the maintenance crew to get in on both sides and do a good cleaning job.

Ductwork into the manufacturing area can be constructed of either galvanized steel properly reinforced and supported to prevent breathing, or aluminum ductwork designed on the same basis of heavy construction to prevent vibration and breathing.

Grille Standardization

Air distribution is of prime importance since a uniform flow of air throughout the room is necessary to maintain a desired condition. Standardization of equipment is very desirable, since the maintenance group must carry certain stock articles in order to do their job efficiently and promptly. Manufacturers have designed and manufactured grilles with removable cores. Therefore, grilles designed for the installation should be of as few sizes as possible. When cleaning is necessary, the grille core can be removed, a clean one put in its place and the dirty one removed from the location to a point where cleaning will not interfere with process operations. In some parts of a cigarette manufacturing building, it will be desirable to have pan outlets (nothing more than a pan placed below the opening in the duct diverting the air stream. (See cover). These outlets will not be removable for cleaning purposes. It will be a matter of wiping the surfaces whenever an accumulation of dust or dirt appears. Remember their accessibility.

All ductwork throughout the room will be checked periodically for dust accumulation. Inside of the ductwork will probably have to be cleaned on an annual basis. The inside of the duct is more readily available with removable core grilles. Determination of when grilles and outer surfaces are to be cleaned is an operational function, made after the installation.

Other Maintenance Tips

All controls should be checked on a daily basis since the function of the operation is the result of proper control instruments.

Water removal from cooling tower will have to be determined on the job site and if water treatment is used, operating period can be extended over the full summer period. However, this practice is a local condition and that will be determined when the plant is placed in operation. There will be the screens to be removed and cleaned. This may require a daily operation. Standard practice is to clean these screens once a day, having a dual set; one set can be removed and cleaned while the other set is functioning in the cooling tower.

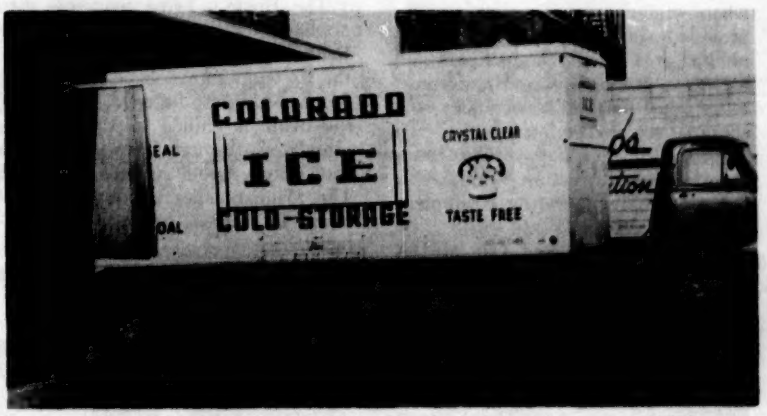
Maintenance of any refrigeration equipment requires a full time operator checking oil, refrigerant, water temperatures, loading conditions, outside temperatures, etc. It also requires one-a-year cleaning of the cooler and condenser tubes. It is necessary to remove the insulation over the cooler heads and the head itself at both ends, so that tube brushes can be pushed through from one end to the other. Access should be allowed for tubing removal. In standard coolers, this is approximately 12 feet. This space should be available for easy access. This same thing applies to the condenser.

In conjunction with refrigeration machinery, in order to keep constant control over the equipment and its operation, an hourly log should be developed so that figures can be computed throughout the year.

In order to develop a fully efficient operating and maintenance organization, it is suggested that classes be given engineering groups on a periodic basis. The subject of equipment and its control should be given full and very careful consideration. Many manufacturers of major equipment have men available that will come and discuss the maintenance problems of their particular equipment with such a group. Educational associations, such as NAPRE, will also devote certain portions of their annual programs (where management and engineers in the locality indicate their interest) to special classes for the industry.

New Highway Refrigerated Trailer Services Vending Stations

MORE economical and efficient servicing of automatic vendors over routes extending as far as 50 miles from the home plant in Denver, is the result of the addition of a new "deluxe" highway trailer, to the rolling fleet of Colorado Ice and Cold Storage Company, Denver, Colorado.



Refrigerated trailer is being loaded at dock of Colorado Ice & Cold Storage ice plant, Denver, Colo.

The new, stainless steel trailer, one of the most elaborate to be constructed for the Colorado firm, is 20 ft long, 8 ft wide, by 6½ ft high, which permits adequate capacity to carry either paper or plastic-sacked cube ice, sized ice, and additional payloads of block ice, over long distances.

Insulation

The trailer body is insulated throughout with six inches of Styrofoam, in addition to a layer of spun glass, and is lined throughout with oak paneling, which has proven itself the material best qualified to withstand heavy usage, over long distance transportation, in previous Colorado Ice and Cold Storage Company experiments. The interior contains four oak-railed drainage racks, for "over and under" distribution of the load, and a heavy, deck-plate floor, of non-slip design.

Refrigeration is provided by five holdover plates, which, hooked up for overnight charging at the refrigeration service platform of the company, are reduced to 18 degree temperature, and can maintain a subfreezing temperature, over 24 hours of heavy usage.

The body is built throughout of heavy 18 gauge stainless steel, and forms an effective "rolling billboard" according to Henry R. Williams, supervisor. Maximum distance planned at present is the 60 miles to Estes Park, Colorado, a mountain resort community which is now operating on a year-round basis.

Improved Ice Rink Now Available For Fall and Winter Use

THE ICE skating season in Hamtramck, Mich., is no longer dependent on a long, cold winter. The rink in Veterans Memorial Park could be used for only ten days during the season of 1953, when dependent on natural ice but now the facilities can now be used throughout the entire fall and winter.

Ice Rink Installed

The difference was achieved by the installation of a Beltemp ice rink, including 9½ miles of 1-inch steel pipe to circulate chilled brine to every part of the 85 by 185-foot area. The system, which is completely automatic, permits ice to be maintained at all times at any desired condition. There's a choice between hard ice for hockey, damp ice for figure skating, wet ice for racing, and ice halfway between hard and damp for pleasure skating, simply by changing the setting on a thermostat.

Hamtramck is a city of two square miles, with more than 40,000 population, entirely surrounded by the city of Detroit. For a number of years, when winter came, ice skating was provided simply by flooding an asphalted area outside the ball park and letting it freeze. But in Hamtramck, as in other parts of the country, the winters are becoming milder. To keep the skaters happy, the Hamtramck City Recreation Commission ordered the refrigerating equipment installed.

Charles R. Beltz and Co., of Detroit, who designed and constructed the rink, sought every means to provide a high quality installation, that would give long, dependable service, while keeping the costs as reasonable as possible. Spang CW Steel Pipe, made by the Spang-Chalfant Division of The National Supply Co., was used to circulate the chilled brine.

The pipe is supported by steel "sleepers" directly over the ground, using sand fill to make a level grade. Sand is used around the pipe and over it for cushioning and insulating purposes and to absorb water when the ice is allowed to melt. Circulation of the brine causes the sand to freeze, which in turn freezes water sprayed above it.

Icemakers

Two 100-hp Beltemp Icemakers using Freon 22 as the refrigerant, are located in a 24 by 24-foot compressor room at the edge of the rink. Mounted on each compressor is a water-cooled condenser, a brine cooler, heat exchanger, expansion valves, and thermostats.

The Freon-to-brine principle, first applied to a skating rink by Charles R. Beltz and Co. in 1947, permits the ice temperature to be varied from 25 to 32 F as desired. In general, the brine is chilled to 15 F and is circulated through the pipes at a rate above 1600 gallons a minute. The brine reaches a temperature of about 17 degrees by the time it returns.

Sodium bichromate and caustic soda are used in the brine to keep it in an alkaline condition, maintaining a pH about 8 to 10. This inhibits corrosion, which could be caused by a highly-acidic brine solution.

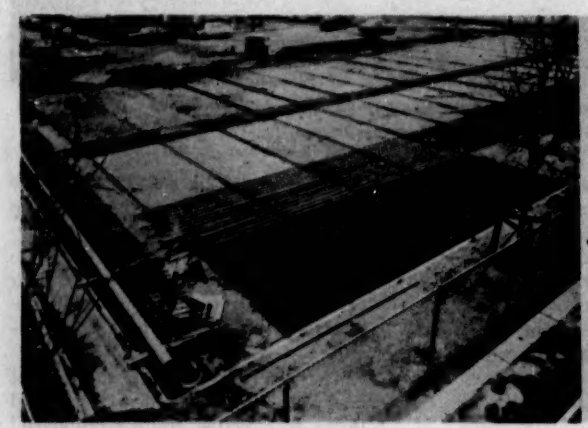
Seven Man Crew Installs Pipes

The workability of the steel piping made a simple job of the installation. A seven-man crew completed the job in only three weeks working time. Four men were used for gas welding the 40-foot lengths of pipe, two men for placing the welded sections into place, and one man for arc welding the pipe to the headers. Once the sections of the steel pipe were joined, They were placed on the steel sleepers, which maintain the pipes on 4-inch centers. The sleepers themselves are on 10-inch centers.

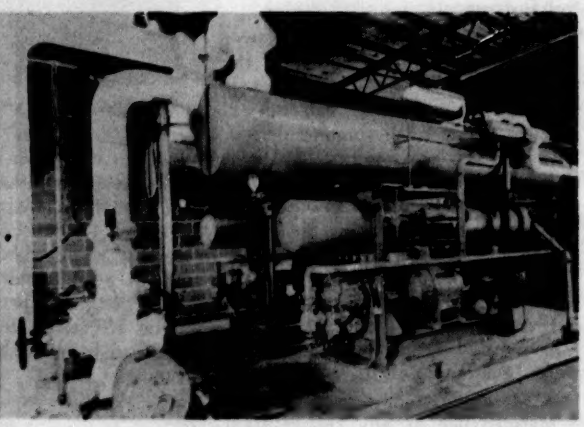
When the pipe installation was complete, it was tested hydrostatically under a pressure of 125 pounds per square inch. The pipe itself is made to withstand pressures up to 800 pounds per square inch, but the test was limited to the rated capacity of the fittings.

Explosion Damages Engine Room in Storage Plant

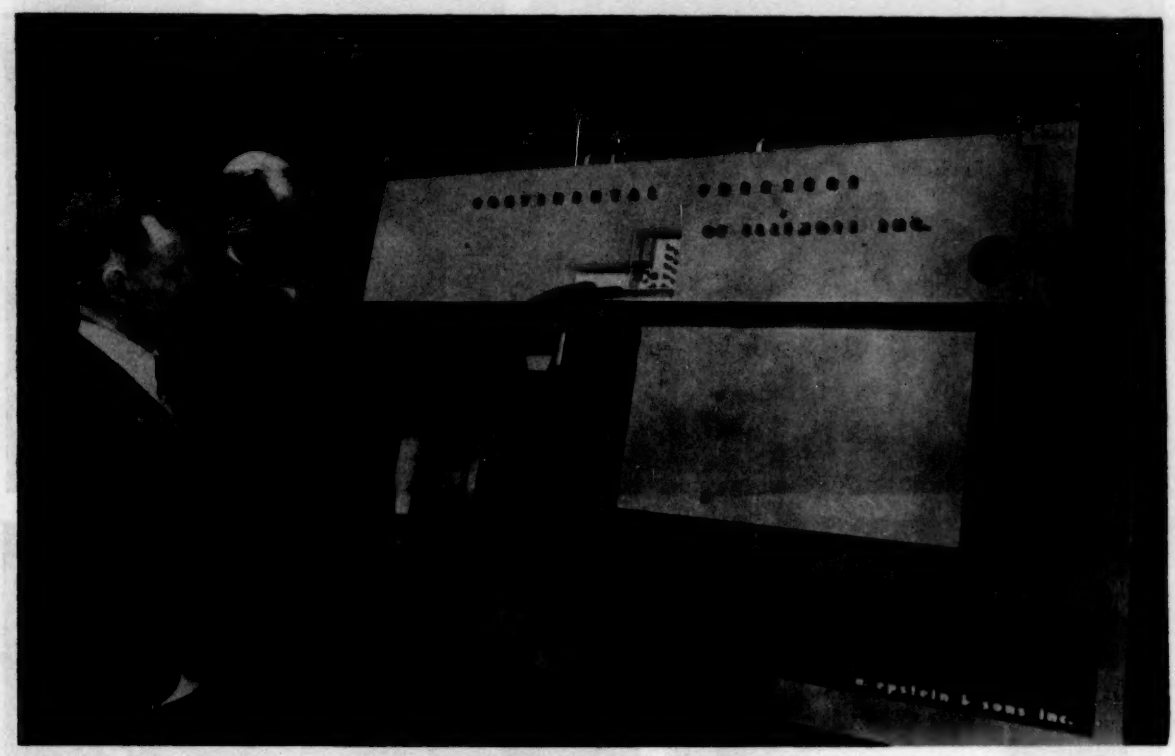
THE engine room of the Ontario Storage Corp., Ontario, was damaged by explosion of an ammonia compressor. Paul Lingle, the night engineer, escaped injury. The blast blew out two walls of the engine room and the roof collapsed.



Scene during construction of Beltemp Ice Rink at Veterans Memorial Park, Hamtramck, Mich. Brine supply and return headers, to which short pieces of 1-inch steel pipe are welded, are shown at the left, while additional 1-inch pipe, on 4-inch centers, is being installed to cover the rest of the rink area.



Compressor room for Beltemp Ice Rink at Veterans Memorial Park, Hamtramck, Mich. Two 100-horsepower Beltemp Icemakers are mounted on concrete slabs just above the floor. A water-cooled condenser, a brine cooler, heat exchanger, expansion valves, and thermostats are mounted on each Icemaker.



Continental Freezers President Kenneth L. Stepleton discusses a feature of the plant machinery space from a scale model with Jack L. Hemery, treasurer and general manager.

Continental Freezers Adds New Storage Facilities for Frozen Foods

RALPH J. EPSTEIN
A. J. SANDER
A. Epstein & Sons Inc., Engineers
Chicago, Ill.

REPORTED by INDUSTRIAL REFRIGERATION in 1951 and 1952, as a modern pioneer in cold storage construction East of the Rockies, Continental Freezers of Illinois, Inc., had just concluded work on a completely palletized one-story structure. Less than four years later, major additions in low-temperature storage, and "service" facilities for customers in the line of "break-up" rooms and blast freezers, have been placed in service by this fast growing concern. Photographs (Fig. 1) illustrate a few features of such services.

Directly south of the present 200,000 square foot Continental Freezers' building, constructed in 1951, a new addition to their facilities has just been completed. Total area of this one-story structure is over 40,000 square feet, of which 31,000 square feet, or 650,000 cubic feet, is designed to be operated at minus 10 F, total storage capacity being 10,000,000 pounds. Compressor capacity, pipe lines, and structure are all sized for expanding the building and freezer areas.

Corridors Heat Protected

There are unloading facilities for four railroad cars and nine trucks which feed into freight handling corridors permitting rapid transfer of merchandise to the freezer rooms. These corridors are insulated by Fiberglas with roof overhangs to decrease the sun load on exterior walls as well as to protect truck doors. Furthermore, ducts lead in cold air from the completely ventilated subfloor space. All of these factors tend to protect merchandise and prevent the accumulation of frost on freezer doors. The doors are Jamison superfreezer, overlap type, operated by the Air-Lec system, and the jambs, head and sills are electrically heated. See Fig. 2.

The new freezer building is used as a "break-up" operation for Jewel Tea Co., Inc., and as warehouse space for Continental. Continuous traffic, by fork-lift trucks, must flow between the two buildings.

Shuttle-Bridge Traffic

It will be noted from the site plan and elevation (Fig. 3) that the existing building and the new are separated by three railroad sidings, one serving each of the two freezer buildings and the third the 100,000 square foot Atlantic and Pacific meat warehouse and cutting plant.* Switching is presently done twice a day. The problem of crossing the tracks was solved by the installation of a specially designed self-propelled eighty foot structural steel bridge capable of moving horizontally at 150 feet per minute in either direction. (See Fig. 4.) Power is supplied by a fixed contact on the building, sliding on a covered bus bar mounted on the bridge.

The "shuttle bridge" operates on

*A & P meat plant was also designed by A. Epstein & Sons, Inc. It has its own automatic fluorinated hydrocarbon refrigerating systems, even though conveniently located on the same tract with Continental.

Fig. 1 — To expedite service, all shipping and receiving is controlled from this office in the original building, pictured at top left. Pneumatic tubes reach truck and rail docks at strategic points. At lower left, Continental employees drop a crib over incoming product to facilitate handling and stacking. Photos at right are views of old and new break-up rooms. At top, warehousemen ready an order for Lafayette Foods, Inc.; lower figure is view of new Jewel Tea Company break-up room.

standard gage railroad track which is broken at each of the through tracks, and any one pair of the bridge wheels may actually hang in mid-air at the time of crossing. It is obvious that switching would be dangerous with the bridge in "closed" position, so derails and signals were installed some 500 feet up the track. The derails, electrically locked, cannot be opened until the bridge is "opened"; the request for said movement being made by the railroad switchmen via telephone from the derail point to Continental Freezers' control tower.

Construction and Insulation

General construction of the building is steel frame supporting precast concrete slabs, bay sizes being 40 x 42 ft. The columns are fireproofed to a height of 20 feet, the City of Chicago classifying the building as fireproof. Exterior walls are pressed brick backed up with concrete masonry units, and the partitions between the corridor and the freezer are also of concrete masonry, insulated.

Frozen soil expands and heaves, and each building designer is confronted with the problem of protecting his building's floor from this natural phenomenon. Continental Freezers' buildings are so designed that the floor is raised four feet above the earth, providing a completely ventilated chamber below. The floor, therefore, becomes a reinforced concrete structural slab, designed to support the heavy storage loads above.

The whole freezer area is surrounded — four walls, roof and floor — by eight inches of Fiberglas insulation. The vapor seal is on top of the subfloor, below the insulation, and the roof insulation is only spot mopped below the pitch and gravel roofing. Wall insulation is applied dry between treated wood studs against an aluminum foil vapor seal. This insulating system, therefore, is completely vapor porous from the seal on the warm side, completely through to cold areas. The inner or freezer side is protected by ⅛ inch thick perforated Masonite (pictured in Fig. 5) painted white for appearance and cleanliness. Illumination is increased by the white walls and aluminum painted roof structure, aiding the light from overhead fixtures.

Fig. 2 (Left) Fork lift driver enters new freezer room at Continental, through super-freezer overlap door, equipped with "Air-Lec" operator. At right, he demonstrates electric push-button open and close controls. Jamison doors are equipped with "Frostop" electric sill and casing heaters to eliminate frost accumulation.

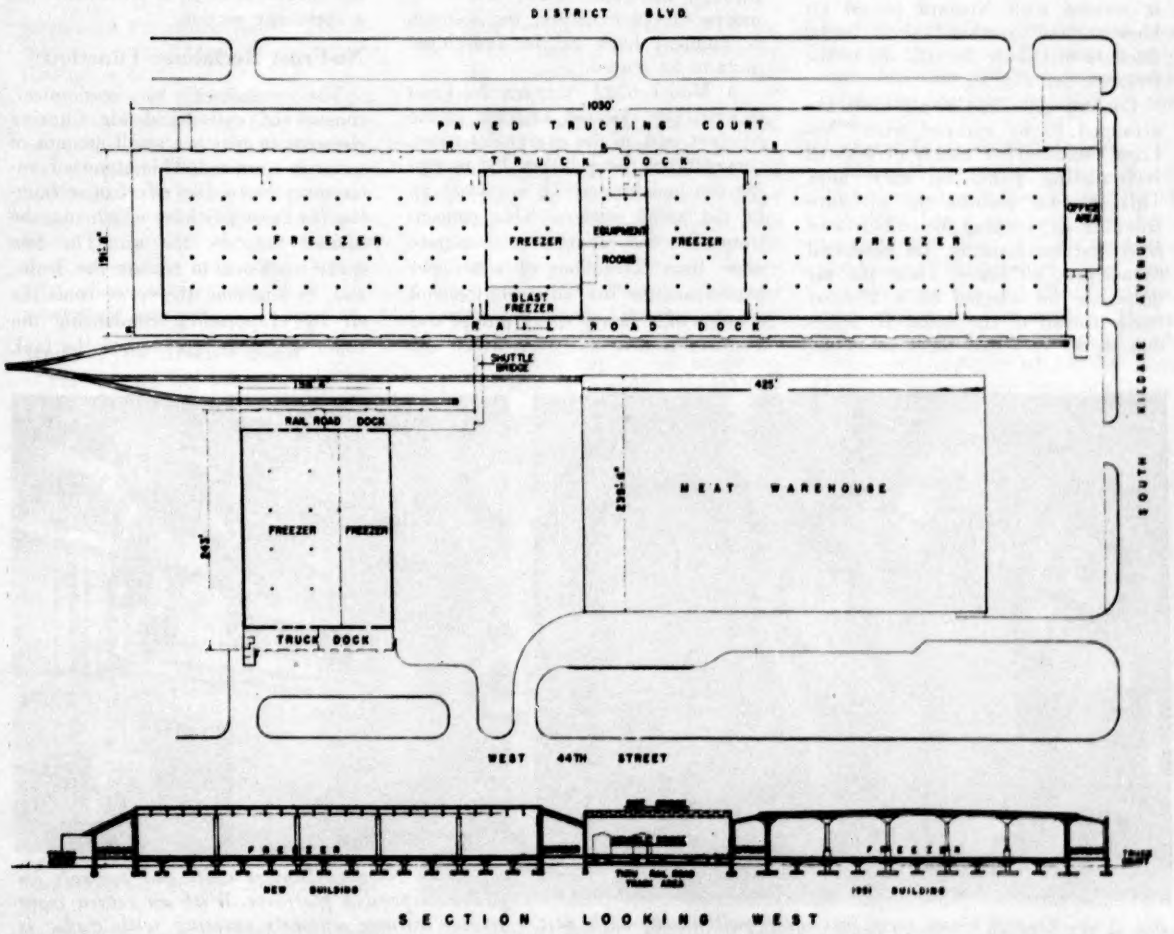


Fig. 3 — Plant layout at Continental Freezers. Top illustration depicts existing building constructed in 1951; new freezer storage is at lower left of the view, and A & P meat warehouse at lower right. Elevation looking westerly is below the plan view.

Fig. 4 — (Left) Self-propelled movable bridge used to cross three railroad sidings between main plant and new freezer rooms. (Right) Permanent overhead bridge carries "No Frost" supply and return, refrigerant suction and liquid lines, communication and 440-volt service, and pneumatic conveyor tubes. Note mechanically refrigerated BREX car spotted beneath.

Machinery Additions

The refrigeration system for the new addition was installed by the Burge Ice Machine Company, the original building machinery contractors. Watkins' ammonia recirculation is teamed with Niagara forced air blowers and overhead sheet metal ducts to distribute the cold air in the freezers. See Fig. 6.

Cooling coils in the air units are arranged to be sprayed with "No-Frost" solution by means of a small recirculating pump on each unit. This solution absorbs the moisture from the air, keeping the coils free of frost and maintaining full clean-coil capacity at all times. Thus, the air units can be selected on a 24-hour basis instead of the usual 18 hours due to the fact that there is no defrosting time. The diluted solution is constantly being pumped by a separate return pump, through piping suspended above the railroad tracks, to a central receiving tank in the equipment room. After passing through the concentrator which removes excess moisture, the solution is pumped back to the individual units to be reused.

A Model 6722 Niagara No-Frost concentrator, located adjacent to the receiver tank in the equipment room, concentrates the solution by removing the moisture which is picked up in the spray coolers. This concentrator has the capacity to evaporate more than 50 gallons of water per hour from the No-Frost solution and consists of a fan, a spray pump, and a steam heated coil over which the solution is sprayed. This solution is warmed by the heating coil sufficiently to evaporate some of the water in it. Air is circulated by a fan through the spray chamber and picks up the moisture. After the air leaves the spray chamber, it passes through a reclaimer section.

No-Frost Reclaimer Function

The reclaimer, or economizer, consists of cylindrical air filtering elements in which a small amount of water is atomized. This atomized water spray has a dual effect in reclaiming No-Frost particles which may be carried over by the air. The fine spray itself acts to entrain the drops, and, in addition, the spray cools the air by evaporation, condensing the vapor which is returned to the tank

Fig. 5 — Freezer room view just after pull down, with first product to be stored. Aluminum overhead painting and white finished masonite on walls aids illumination. Ductwork extends into the room from units placed over doors at each end.

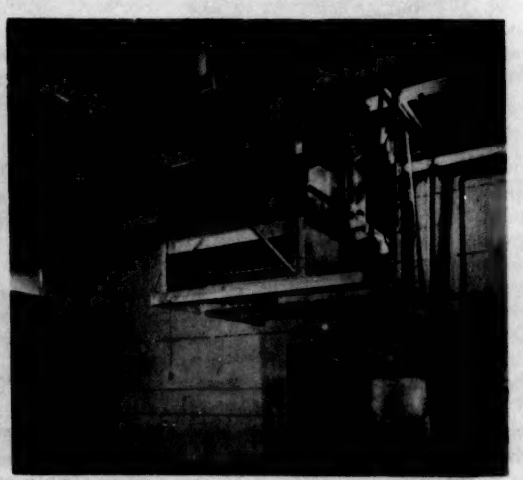


Fig. 6 — Niagara Blower units and controls on girder suspended platform. With air return from below, warmer amounts entering with traffic is lowered in temperature and humidity before reaching stored product. A "No Frost" local receiver and circulating pump is the unit at floor level.

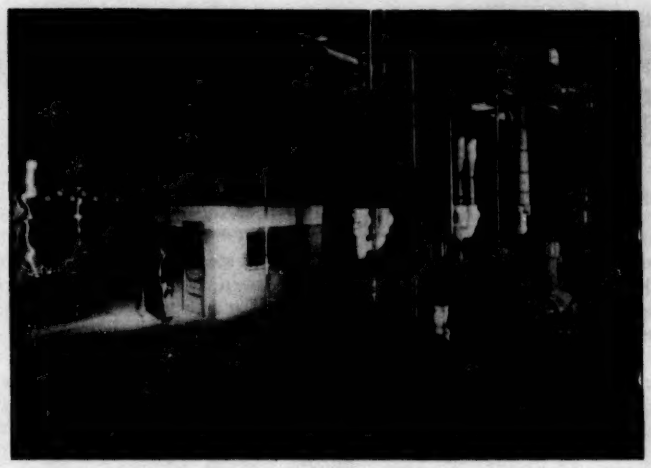


Fig. 7 — Chief engineer Joe Farrell watches functions of Mercoid switches (black faces) on his stainless steel gauge board. A distant reading push-button selector, potentiometer-type, temperature instrument is installed for checking rooms, refrigerant, etc. White faced gauges are compound types for various pressures within the operating refrigerating system. New high speed multi-cylinder Vilter high-stage compressor is in foreground. Fuller rotary boosters are in background, and original VSA units are at the right.

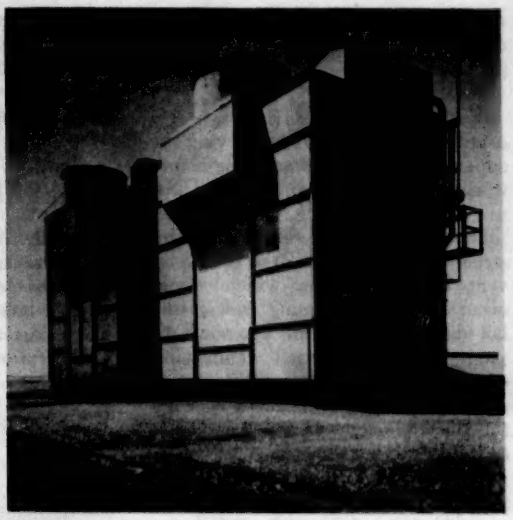


Fig. 8 — Second of two 400-ton evaporative condensers by Niagara, was installed alongside the darker painted original.

section of the concentrator. The humid air is discharged to the outside through a duct.

A shell and tube heat exchanger, located in the solution pipe lines between the receiver tank and concentrator, transfers heat from the warm concentrate returning to the receiver tank to the colder diluted solution being pumped to the concentrator, thus minimizing both steam and refrigeration requirements of the concentration process.

Radio-Type Alarms Used

The proper concentration of No-Frost liquid is automatically maintained by means of a boiling point control system. A small amount of solution from the receiver tank is constantly circulated through the control which has a small boiling chamber heated by an electrical heating element. The solution is heated to its boiling temperature which is determined by the strength of he concentration. The boiling temperature increases with an increase in concentration and the control, by maintaining the boiling temperature, maintains the concentration. An immersion type thermostat in the boiling chambers responds to changes in the boiling temperature and automatically operates the concentrator as necessary maintain the proper concentration of the No-Frost solution.

At each blower, a high frequency impulse transmitter, actuated by a float switch, sends impulses over existing lighting wiring to receivers in the engine room. When No-Frost liquid level rises, a bell automatically sounds, warning the engineer in charge.

Compressors for the blast freezer, for the new south addition, and to provide additional capacity for the plant have all been installed in the existing engine room. (Fig. 7). This equipment, furnished by Burge, is Fuller rotary boosters and Vilter compressors. Additional electrical service has been brought into the building. All equipment is cross-connected so that any or all might be used because of varying loads. The total refrigeration capacity of the plant at present is 700 tons. A new and duplicate 400 ton evaporative condenser has been installed on the roof.

Largest Niagara Condensers

Each of the two Niagara Model 25-440 condensers has a capacity of 436 tons based on 76 F wet bulb temperature and 95 F ammonia condensing temperature. The condensers have two propeller type fans, each direct connected to a 15 hp totally enclosed fan motor, and each has an air capacity of 130,000 cfm. The condensers each have four sepa-

Fig. 9—Interior of "accordion" blast freezer. Plywood panel walls at sides will move laterally, while panels at one end telescope to give varying size to room. Blast inlet and outlet from mezzanine mounted units are dampered according to position of panels.

rate and independent condensing coils which are fabricated of ¾ inch prime surface pipe all hot dipped galvanized.

Each condenser also has two separate Duo-Pass coils for removing the super heat of the ammonia gas before it enters the condensing coils. These are extended surface coils of steel tubes and fins of galvanized construction. These Duo-Pass coils prevent scale formation which would occur on the condensing coils if the hot discharge ammonia gas went directly into the wetted condensing coils. There are two oil accumulators on each condenser located between the Duo-Pass coil and the condensing coils. After the super-heat has been removed from the discharge gas in the Duo-Pass coils, it enters the oil accumulators where the oil is separated and trapped.

Each condenser has a 5 hp water spray pump spraying approximately 300 gallons per minute of water over the condensing coils. Spray nozzles are of the large orifice non-clogging type. It is believed that these two units shown in Fig. 8 are the largest twin-installation of this type Niagara condensers.

More Additions Underway

Concurrent with the construction of the new building, a westerly addition to the 1951 building is being erected for Holloway House, Inc. This structure which will house the production of a large quantity of miscellaneous frozen products has been designed to meet the requirements of the USDA, Bureau of Animal Industry including ceramic tile walls, packing house brick floors, air conditioning for the cutting spaces, a cooler for meat, stainless steel cooking equipment, and ample facilities to meet the government's very rigid requirements.

Accordion Blast Freezer

Within the present building, a major facility for the midwest's frozen food industry has just been completed. The rising demand for quick-freezing of food products in addition to cold storage space has prompted Continental Freezers to have installed a "blast" freezer to accommodate as much as 200,000 pounds at temperatures as low as minus 40 F.

The partitions around the blast freezer room are marine plywood, suspended on rollers in tracks 20 feet above the floor. The fact that the partitions are movable, (See Fig. 9) and capable of changing the size of the room, has prompted the use of the term "accordion" freezer. This room, too, is cooled by Niagara blowers with a No-Frost system. However, these blowers are mounted in an insulated mezzanine outside the freezer, suspended 10 feet above the floor of the railroad dock. Because headroom has been reduced in the dock, photo-electric cells cause a warning bell to sound and the fork lift trucks to lower their masts as they approach the mezzanine.

Tanks Absorb Ammonia Gas As Fire Safety Measure

FOUR 1,000 gallon capacity tanks were installed on the roof of a cold storage building 39, USN Depot, Seattle, late in 1954 for the purpose of absorbing ammonia gas from their refrigeration equipment in case of fire. The four tanks (5 x 7 x 7 ft. each) were made from surplus pontoons under the direction of Gilbert H. Hickok, Utility Supervisor, who originated and developed the idea. The photograph of the installation shows how the tanks were welded to a channel iron frame supported by a former water tower foundation.

Tanks installed on roof of cold storage building to absorb ammonia gas from refrigerating equipment in event of fire.

Hickok, President of the Seattle chapter, NAPRE, explained this installation to fellow employees at the Naval Supply Depot as follows: "In a cold storage plant, where ammonia is used as the refrigerant, some provision is always made to dump the ammonia in the event of an uncontrollable fire, usually through a diffuser to the roof. This is done to prevent a violent explosion.

"In the original installation, Bldg. 39 was no exception to this rule. To dump 3,000 lbs. of high pressure anhydrous ammonia in the narrow confines of the valley in which this station is situated could well be more dangerous than any fire. One half of one percent of ammonia (.5%) by volume mixed with air is fatal to human life in a matter of seconds. "Since anhydrous ammonia has an affinity for water, four large water tanks have been installed on the roof of the building of sufficient capacity to absorb the entire charge in the plant. The resultant highly concentrated aqua-ammonia could then be slowly dissipated by the normal flow of condenser water that drains into the bay, without the risk of dangerous fumes."

Mr. Hickok further explained that the ammonia lines are of equal length to all tanks, entering the tanks at the top and extending to near the bottom, with no valves in the lines between the dump position in the plant and the tank on the roof. Water lines enter at the top and also go to the bottom of the tanks. Overflow is through an inside standpipe. Water lines are intentionally made small so that a highly concentrated solution can be dissipated at a very slow rate.

Early Refrigeration Note

IN 1851 a dairyman in northern New York erected bins in a freight car, filled them with ice and loaded the car with butter for the Boston market. It was received in first class condition. So far as is known, this was the first refrigerated shipment of perishables in American railroad history. — Mo-Kans-Texas Railroad Magazine.

Ice Sales in 1954 – 30,183,785 Tons – Processed Ice Sales – 5,033,176 Tons

ICE SALES in 1954, according to results of a survey published by the National Association of Ice Industries, amounted to 30,183,785 tons. Processed ice sales were 5,033,176 tons. This compares with total ice sales of 32,223,916 tons and 4,724,219 tons of processed ice in 1953.

The survey questionnaire which was sent out to members of the industry this year contained some new questions. These questions related to significant phases of the changing ice business; they included dollar sales, a breakdown of processed ice sales, and the use of automatic vending outlets as a market for ice.

The summary of the annual survey follows:

1—Total Ice Sales — 30,183,785 tons — a decline of 6.36 percent from 1953.

2—Combined Sales of All Processed Ice — 5,033,176 tons; an increase over 1953 of 6.54 percent.

3—Ice Cube Sales totaled 747,521 tons; a decline of 1.54 percent.

4—Sized Ice Sales were 2,231,954 tons; an increase of 6.94 percent.

5—Crushed Ice Sales were 2,053,701 tons; an increase of 9.36 percent.

6—Average Gross Revenue per ton of Ice sold for those companies which reported:

	1953	1954
All Ice Sales	$ 7.40	$ 7.49
Ice Cubes	20.95	21.59
Sized Ice	13.03	13.12
Crushed Ice	11.48	11.83

7—The Load Factor of the operating plants was 41.34 percent; relatively unchanged from the past year.

8—The Natural Ice Industry accounted for only 69,745 tons — .23 percent of total sales — approximately the same as 1953.

9—Total Daily Capacity of plants in operation was 200,057 tons; 6.48 percent below 1953.

10—Seasonal Storage — 2,049,600 tons of Ice went into seasonal storage in 1954.

11—Automatic Vending Outlets for the sale of Ice increased 13.15 percent over 1953.

Table 1 shows that for the first time since 1950 none of the Divisions showed gains. However, two had losses of less than 2 percent. The Southwestern Division had a decline of 1.81 percent — exactly the same as last year. Three Divisions — New England, Great Lakes, and the Pacific Coast — had losses of 10 percent.

TABLE 1—TOTAL ICE SALES IN UNITED STATES FROM 1950 THROUGH 1954

	1950		1951		1952		1953		1954	
Division	Tons	% Change Over 1949	Tons	% Change Over 1950	Tons	% Change Over 1951	Tons	% Change Over 1952	Tons	% Change Over 1953
New England	1,681,771	−23.63	1,692,702	+ .65	1,803,743	+6.56	1,677,301	−7.01	1,503,029	−10.39
Eastern States	6,443,032	−20.34	6,356,051	− 1.35	6,471,096	+1.81	6,066,005	−6.26	5,697,798	− 6.07
Southeastern	4,563,314	−17.15	4,570,615	+ .16	4,512,111	−1.28	4,106,021	−9.00	3,984,483	− 2.96
Southern	2,649,015	−20.54	2,608,750	− 1.52	2,440,225	−6.46	2,383,368	−2.33	2,297,567	− 3.60
Southwestern	4,248,922	−11.96	4,828,050	+13.63	4,856,053	+ .58	4,768,158	−1.81	4,681,854	− 1.81
Great Lakes	5,960,862	−21.73	5,641,360	− 5.36	5,546,021	−1.69	5,314,197	−4.18	4,743,452	−10.74
Western	2,580,702	−19.92	2,512,571	− 2.64	2,571,365	+2.34	2,603,507	+1.25	2,411,629	− 7.37
Mountain States	1,063,307	−22.92	1,055,332	− .75	1,003,832	−4.88	1,076,710	+7.26	1,057,975	− 1.74
Pacific Coast	4,204,076	− 8.13	3,998,497	− 4.89	3,984,502	− .35	3,688,055	−7.44	3,298,965	−10.55
Northwestern	502,797	−14.25	525,574	+ 4.53	549,435	+4.54	550,644	+ .22	507,033	− 7.92
TOTAL U. S.	33,897,798	−18.00	33,789,502	− .32	33,738,383	− .15	32,233,966	−4.46	30,183,785	− 6.36

TABLE 2—TOTAL ESTIMATED SALES OF PROCESSED ICE IN TONS

	Ice Cubes			Sized Ice			Crushed Ice		
Division	1952	1953	1954	1952	1953	1954	1952	1953	1954
New England	68,578	64,862	59,578	59,858	53,581	57,107	74,464	78,982	78,216
Eastern States	210,321	204,932	200,272	432,856	448,832	460,403	183,493	207,503	238,212
Southeastern	76,575	76,310	96,983	270,454	303,209	365,151	146,925	206,169	248,888
Southern	9,822	9,313	8,919	95,130	104,427	115,906	48,912	55,953	68,610
Southwestern	16,004	14,786	12,410	209,257	218,265	241,425	641,322	640,342	683,878
Great Lakes	175,459	163,781	135,414	495,217	489,755	478,206	227,734	315,568	344,169
Western	86,210	84,502	86,448	186,553	194,865	222,709	165,953	179,403	194,032
Mountain States	12,551	11,603	10,220	49,082	50,720	47,760	41,200	39,980	39,900
Pacific Coast	129,387	126,459	135,150	195,872	199,154	218,880	67,185	60,879	65,873
Northwestern	2,495	2,665	2,145	22,836	24,301	24,411	80,132	93,148	91,889
TOTAL U. S.	785,366	759,213	747,539	2,017,115	2,087,109	2,231,958	1,677,320	1,877,927	2,053,667
% Change Over Preceding Year	+ 3.27%	− 3.33%	− 1.54%	+ 5.39 %	+ 3.47%	+ 6.94%	+ 3.86%	+11.96%	+ 9.36%

TABLE 3—PERCENTAGE OF COMPANIES PROVIDING PROCESSED ICE SERVICE

	Ice Cube Service			Sized Ice Service			Crushed Ice Service		
Division	1952	1953	1954	1952	1953	1954	1952	1953	1954
New England	73.9%	76.5%	68.4%	69.6%	64.7%	52.6%	52.2%	47.0%	68.4%
Eastern States	42.4%	41.5%	44.6%	41.4%	42.8%	43.1%	52.5%	50.6%	63.1%
Southeastern	14.2%	13.8%	17.4%	31.1%	33.3%	29.3%	72.6%	77.0%	89.1%
Southern	12.3%	9.1%	10.0%	41.5%	36.4%	44.0%	72.3%	70.9%	82.0%
Southwestern	15.4%	14.8%	9.8%	26.9%	35.2%	39.0%	78.8%	70.4%	68.3%
Great Lakes	55.3%	54.6%	46.8%	52.4%	51.2%	50.6%	55.3%	59.3%	62.0%
Western	46.2%	43.3%	38.9%	38.5%	48.3%	48.1%	60.0%	63.3%	64.8%
Mountain States	41.2%	64.3%	64.7%	47.1%	64.3%	70.6%	64.7%	71.4%	58.8%
Pacific Coast	70.8%	66.7%	66.7%	29.2%	29.2%	37.5%	37.5%	37.5%	50.0%
Northwestern	20.0%	15.4%	21.4%	45.0%	53.8%	50.0%	50.0%	46.1%	64.3%
TOTAL U. S.	35.7%	34.9%	34.1%	40.8%	42.7%	43.3%	61.8%	62.6%	70.3%

Cube sales (Table 3) showed a substantial gain in the Southeast. There were also gains in the Pacific Coast and Western Divisions. These gains were lost in the national total, however, by decline of sales in some other Divisions, particularly New England and the Great Lakes. Sized ice sales increased in all Divisions but two — Great Lakes and Mountain States. The Southeast had a 20 percent increase. The Western Division had 14 percent. The Southern and Southwestern Divisions each had over 10 percent. This gave a 6.94 percent gain for the country as a whole.

There was some shifting in the types of processed ice service provided in the various divisions, as shown in Table 3. For the country as a whole, however, there was little change in the percentage selling cubes and sized ice. There was a 7.7 percent increase in the availability of crushed ice service.

The revenue per ton figures should not be confused with price schedules. The $7.40 and the $7.49 are the average dollars and cents per ton realized when total dollar volume is divided by total tons of Ice sold. The sales include all types of ice sold and sales to all price schedule classifications. In like manner, the revenue per ton figures for cubes, sized, and crushed ice represent gross sales divided by the tons sold in each of these categories.

The number of sales locations with automatic vending equipment increased 13.15 percent.

Exposed Ductwork Problem Solved in Air Conditioning Installation in Bank

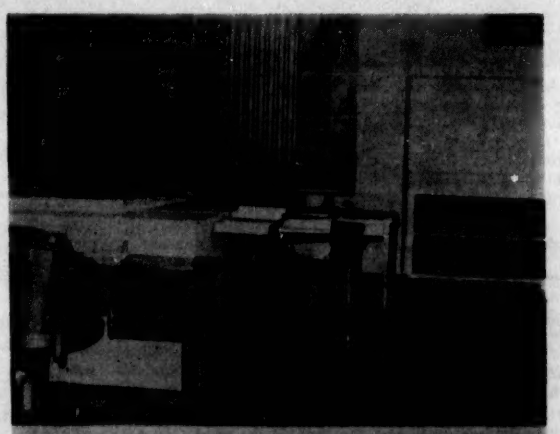
A PROBLEM in air conditioning was presented when The Virginia Trust Company, Richmond, Va., decided to air condition the mezzanine, the banking room and the directors room. Due to the interior design it was important to avoid exposed ductwork. The total area of the building is 60 x 100 feet with a 50 ft. ceiling height over the public area and a T-shaped mezzanine 15 ft. above the main floor. The mezzanine was finished with ornamental balusters and rail. The distance from the front of the mezzanine to the entrance doorway is 56 ft. and there are no fully enclosed private offices. One area behind the tellers cage is enclosed by an 8 ft. partition, with no ceiling and open doorway.

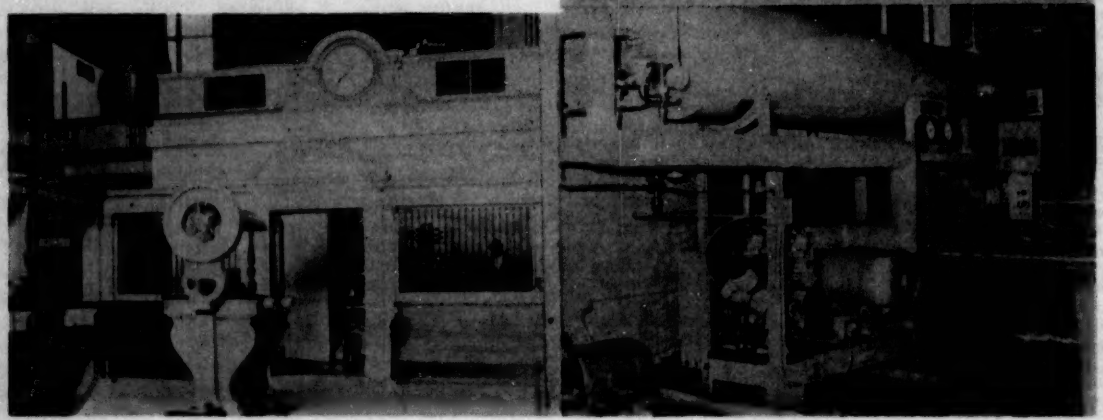
A Worthington AVY-500 air unit with 6-row chilled water coil and high velocity filters was located on the mezzanine. This unit discharged into a large plenum from which the main delivery duct turned downward and followed the line of the rail at the floor. Balusters were removed from the front of this railing and two large grilles were installed in these spaces to supply the main banking area. Small grilles on the two sides of the leg of the T provide conditioning for the areas on both sides of the vault.

Supply to the directors room was through a second take-off from the plenum chamber by a duct running through a window and down the outside wall with delivery through a grille at the top of the directors room window. The door to this room was undercut for relief and all returns were free to the unit.

Supply to the mezzanine was through a grille on the face of the plenum chamber. The volume through this grille was controlled by means of an acoustic lined plate, larger than the grille and movable backward and forward from the opening.

The machine room is in the subbasement and circulating lines are run on the outside back wall of the building. Control is by modulating 3-way bypass valve with the water at constant temperature.





Below: View of lobby from entrance, showing Worthington AVY 500 air unit and main delivery grilles. Right, above: Mezzanine showing air unit and delivery ductwork behind ornamental balcony rail. Right, below: Worthington 4JF4 compressor and water chiller. Condenser is mounted behind the chiller. Worthington chilled water circulating pump at left.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Basic Electrical Controls For Refrigeration Systems

HOWARD WOLFBERG, Engineer
Central District, York Corp.
Chicago, Ill.

Second of two articles on understanding electric controls most essential to industrial and large commercial refrigeration installations, Mr. Wolfberg continues with an explanation of the start-stop push-button station in motor starters. "No voltage protection" is illustrated and explained. Symbols commonly used in control circuits in lieu of detailed drawings, are shown. The single line control wiring diagram and its use is explained and examples given.

Material presented herein is extremely basic but necessary to the understanding of automatic control circuits for motor driven equipment and accessories. This is particularly true for applications involving refrigeration and air conditioning installations which, in general, are rapidly becoming more automatic in nature.

Although concluding this explanation of basic motor controls, which he had given before Chicago Chapter, NAPRE, member Wolfberg has acceded to requests for more installments, at an early date, with emphasis on electric cut-out circuits, un-loaders, and other common refrigerating applications.

SIMPLEST application of a magnetic motor starter to a three phase motor was dealt with in the preceding article, July 1955, INDUSTRIAL REFRIGERATION. By way of review, Fig. 1 illustrates power wiring from the disconnect switch to the starter and from the starter to the motor. Also shown is the control wiring circuit through the single pole switch. Connections L1, L2, and L3 are generally marked as such within the starter, for easy connection on the job to the lines coming from the disconnect switch. Connections T1, T2, and T3 are also generally marked for connection to the motor leads. Connections L1, L2, and L3 are referred to as the *line side* of the starter, and connections T1, T2, and T3 as the *load side* of the starter.

The majority of starters are controlled through the use of *momentary contact*, start-stop push-button stations, and not through the use of single-pole swiches as conveniently illustrated in the previous article. A momentary contact *start* button and an independent momentary contact *stop* button, mounted together in one enclosure, make up a single momentary contact start-stop push button station.

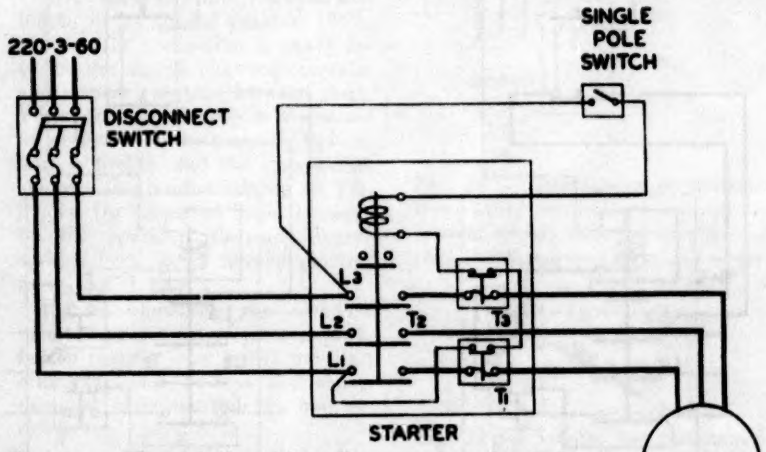


Fig. 1 — Electrician's wiring diagram of snap-switch operated magnetic motor starter with overload protection.

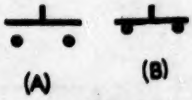


FIGURE 2.

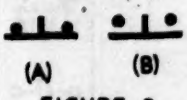


FIGURE 3.

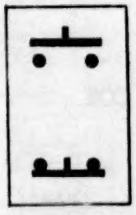


FIGURE 4.

Figs. 2, 3, 4 — Symbols used for push button representation in motor control circuits. Fig. 2 — a Start button: (A), normally open, (NO); (B), under finger pressure. Fig. 3 — Stop: (A), normally closed, (NC); (B), under finger pressure. Complete station represented in Fig. 4, consists of start and stop push-buttons and their enclosure.

Start-Stop Push-Buttons For Momentary Contact Stations

Fig. 2 (A) illustrates a start button in the normal position. Note that it does not touch the set of electrical contacts, and consequently, no electrical current can pass between these contacts. Start button in a depressed position is illustrated in Fig. 2 (B) — a condition which can only be caused by an operator pressing on the start button with his finger. Note

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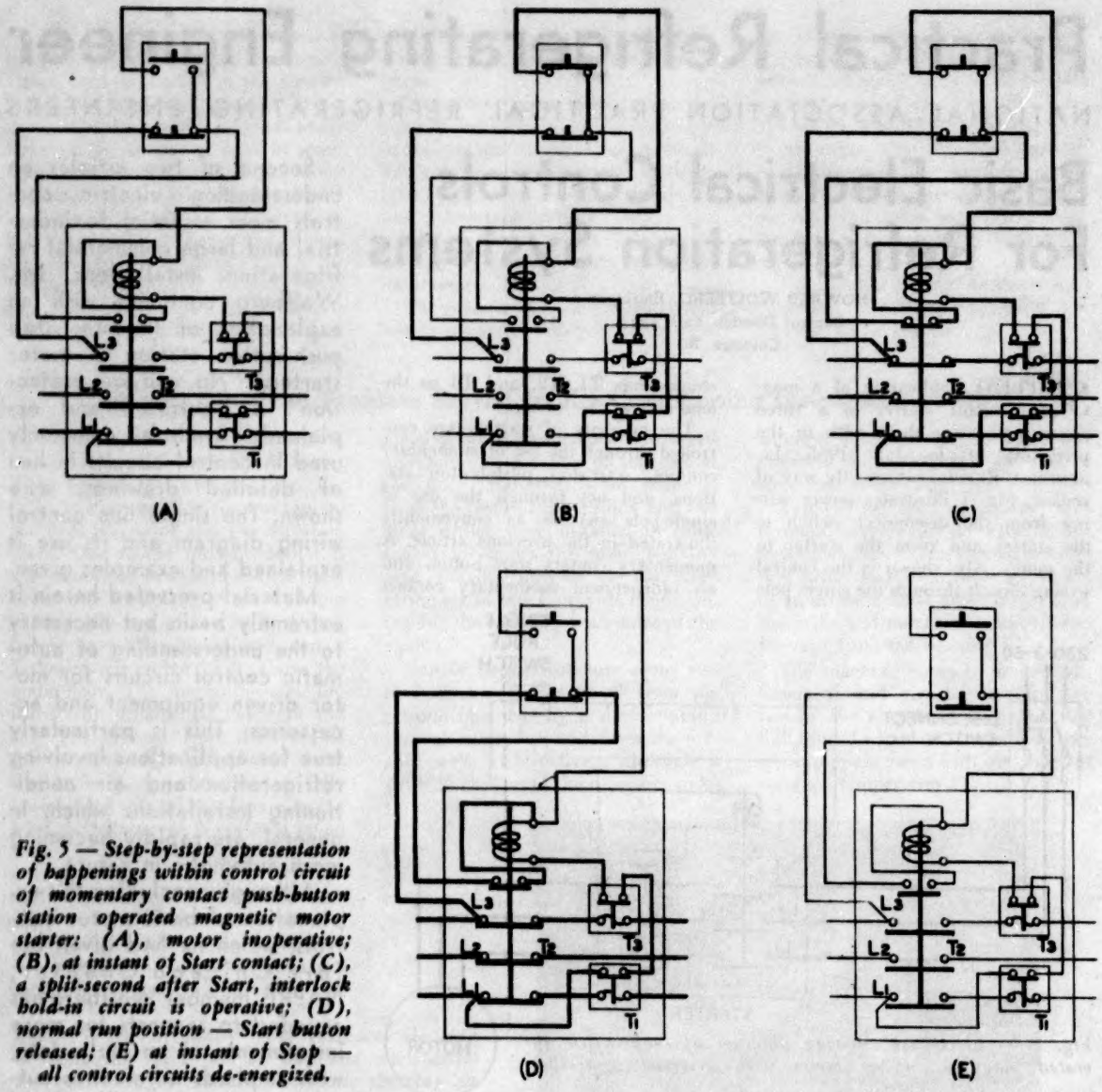

Fig. 5 — Step-by-step representation of happenings within control circuit of momentary contact push-button station operated magnetic motor starter: (A), motor inoperative; (B), at instant of Start contact; (C), a split-second after Start, interlock hold-in circuit is operative; (D), normal run position — Start button released; (E) at instant of Stop — all control circuits de-energized.

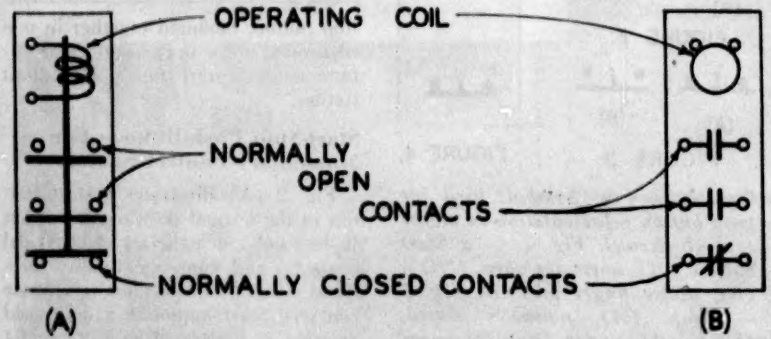

Fig. 6 — Comparison of common pictorial representation with standard symbols used in the trade to represent elements of the magnetically operated switch.

FIGURE 7.

FIGURE 8.

Fig. 7 & 8 — Operating coil is depicted in standard manner in Fig. 7. Fig. 8 (A) is symbol for normally open (NO) contacts or poles; (B), normally closed (NC) contacts.

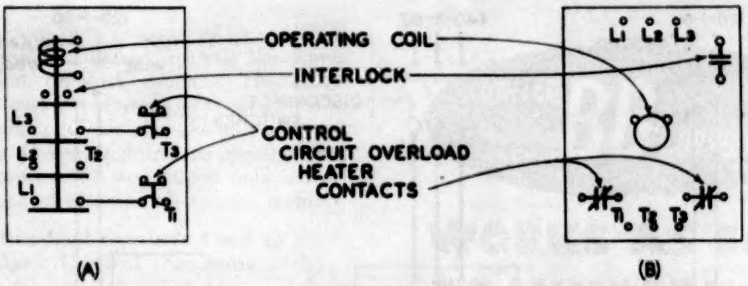

Fig. 9 — Comparison of magnetic motor starter elements: (A), pictorial; (B), standard symbols in common use.

that in the depressed state a connection is made beween the set of electrical contacts and current can pass between them. The depressed condition, as illustrated in Fig. 2 (B) occurs only as long as the operator keeps pressing on the button. On release of finger pressure, the start button springs back to its normal position as shown in Fig. 2 (A).

Opposite to the start contacts (NO), Fig. 3 (A) illustrates the stop button in its normal position (NC). Note that a connection is made between the set of electrical contacts and current can pass between them. When the stop button is depressed by an operator, the electrical connection is broken and the stop button assumes the position shown in Fig. 3 (B). On release of finger pressure by the operator, the stop button springs back to its normal position as in Fig. 3 (A).

Fig. 4 illustrates the complete momentary contact, start-stop push-button station. The individual start and stop push buttons are shown mounted close together in one enclosure.

Use Of Push-Button Stations In Magnetic Starter Circuit

Application of the momentary contact, start-stop push-button station to a motor starter is covered by Fig. 5. In this figure, the heavy lines indicate the circuits through which current is passing, while the lighter lines indicate wire carrying no current.

Fig. 5 (A) shows the starter and push button station as they appear when the motor being controlled is shut down and not in operation. Note that the interlock or auxiliary set of control contacts within the starter is utilized when the push button station is used.

Path of current in the control circuit during the first instant that the start button has been depressed is illustrated in Fig. 5 (B). Current has passed through the start button and the operating coil is energized. The armature has not yet pulled into operative position, and consequently, the power and interlock contacts are not yet closed. Fig. 5 (C) depicts the current paths after the armature has pulled into position, and the power and interlock contacts are closed. The time between the initial depression of the start button, as shown in Fig. 5 (B), and the pull-in of the armature as shown in Fig. 5 (C), is virtually instantaneous — taking only a small fraction of a second.

Once the armature has pulled in, the operating coil is energized through the interlock contacts as well as the start button. Current energizing the holding coil also passes through the normally closed stop button. Fig. 5 (C) also indicates that current flows to the motor when the armature has pulled into operat-

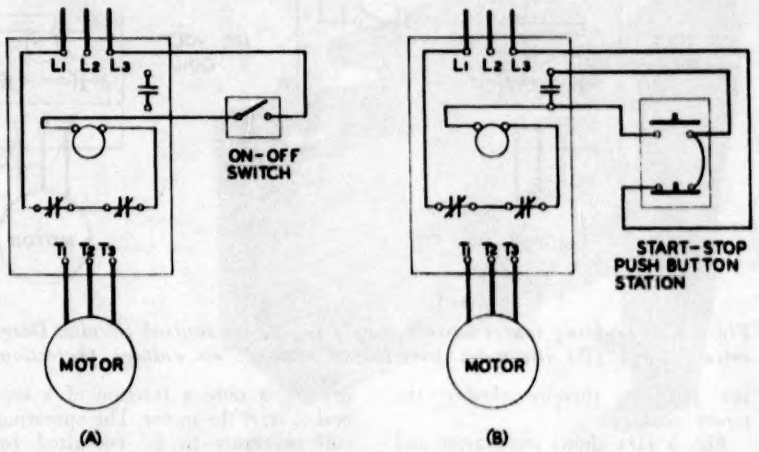

Fig. 10 — Illustration of undervoltage release and undervoltage protection: (A), "no voltage release" — motor stops with voltage failure but control circuit remains operative; (B), "no voltage protection" — motor stops with power failure and operating coil circuit opens, preventing start-up with power restoration.

Fig. 11 — Symbol for maintained-contact push-button station.

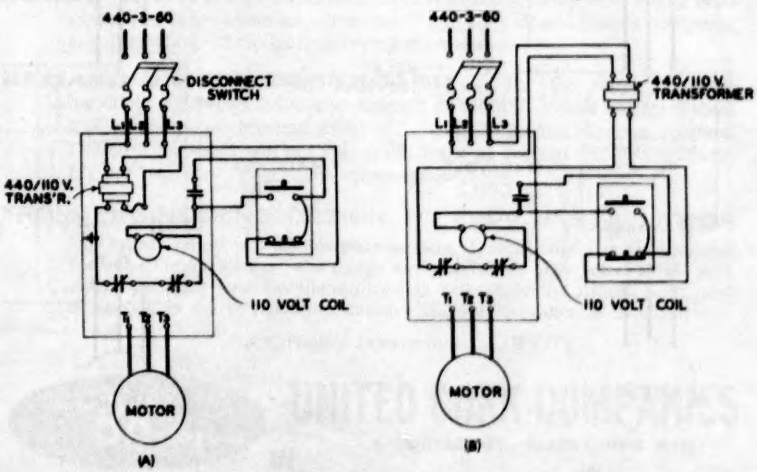

Fig. 12 — High voltage starter with lower voltage control circuit. Source of low power is: (A), transformer in starter enclosure; (B), separately mounted step-down unit.

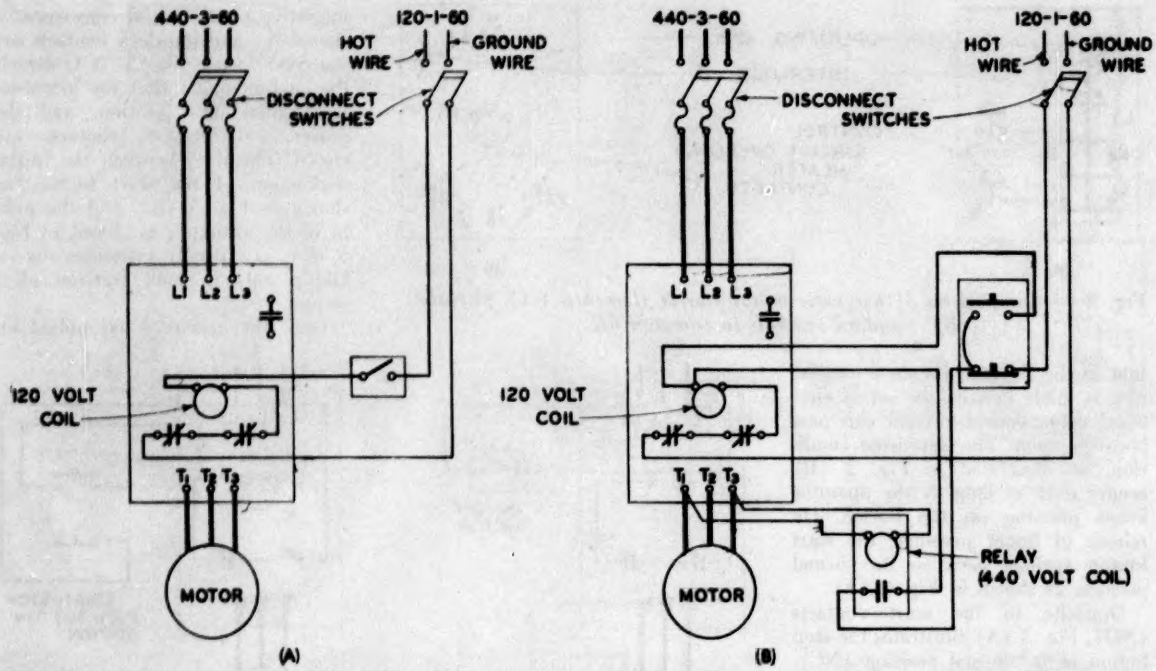

Fig. 13 — Lighting source current supply for starter control circuits. Diagram (A) shows snap-switch "no voltage release", and (B) illustrates push-button station "no voltage protection"; second 440-volt coil must be used.

ing position, thereby closing the power contacts.

Fig. 5 (D) shows the starter and push button station as they normally appear while the motor is operating. Start button is shown in its normally open position since the operator need depress it only a fraction of a second to start the motor. The operating coil continues to be energized by current passing through both the normally closed stop button and the starter interlock contacts.

In Fig. 5 (C) starter and push button station are shown immediately after power has been broken to the motor by depressing the stop button. When the stop button is depressed, its normally closed contacts open and the control circuit to the operating coil is broken. This action allows the

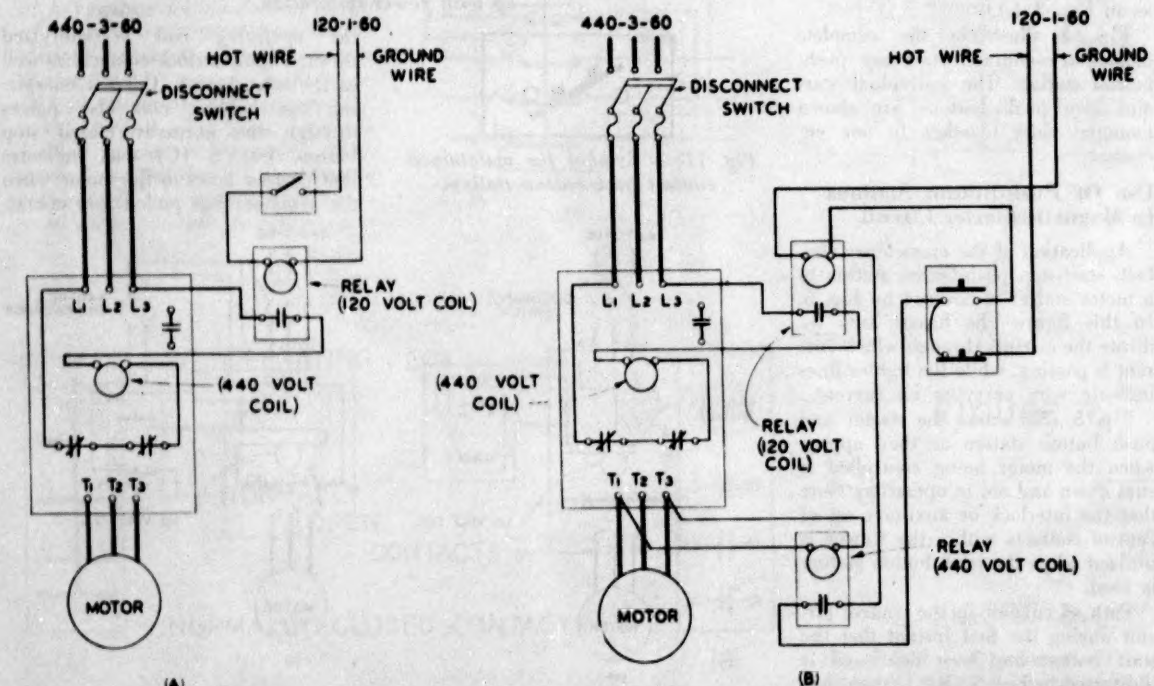

Fig. 14 — To provide single safety-switch advantages over equipment pictured in Fig. 13, a 120-volt relay must be added to the lighting power source. In (A), the new arrangement also provides "no-voltage release"; and (B) continues to have "no-voltage protection".

armature to drop out of its operating position, thereby opening the power and interlock contacts. The motor ceases to operate. The armature drops out so quickly after the operating coil is de-energized that the operator need depress the stop button only a fraction of a second to stop the motor.

Standard Symbols Used in Basic Control Diagrams

For the sake of convenience and clarity, wiring diagrams are prepared using various symbols to denote the portions of electrical equipment important to control circuits. Illustrations of the momentary contact start and stop push buttons previously shown, are examples of the type of symbols used. The operating coils of starters and relays are usually illustrated as round circles instead of the pictorial coils previously shown in these articles. Relay contacts, the interlock, and control circuit overload heater contacts in a starter are usually shown by symbols which are different than which this material previously illustrated.

By way of example, Fig. 6 (A) shows a control relay in the manner previously shown. This relay consists of an operating coil, two normally open poles or sets of contacts, one normally closed pole or set of contacts, and an enclosure. Fig. 6 (B) depicts this same relay with the symbols most often used in wiring diagrams.

From this point on, in this discussion, these more common symbols will be used. Operating coils for relays and starters will be illustrated as in Fig. 7. Likewise, a normally open (NO) set of contacts will be shown as in Fig. 8 (A) and a normally closed (NC) set of contacts as in Fig. 8 (B). As previously explained, *contacts or poles in relays and starters are shown only in the position they assume when the starter relay or operating coil is de-energized.* In other words, a normally open set of contacts is open when the operating coil is de-energized, and is depicted that way in wiring sketches.

Comparison of pictorial and standard symbol, is made in Fig. 9. A starter is pictured in (A) with symbols previously shown. Fig. 9 (B) illustrates the same starter using the more common symbols. In (B) no attempt has been made to show the power contacts or any power wiring within the starter. This is because the power wiring is considered incidental to the control circuit and can be ignored in analyzing control operation. Note also that the control circuit overload heater contacts are

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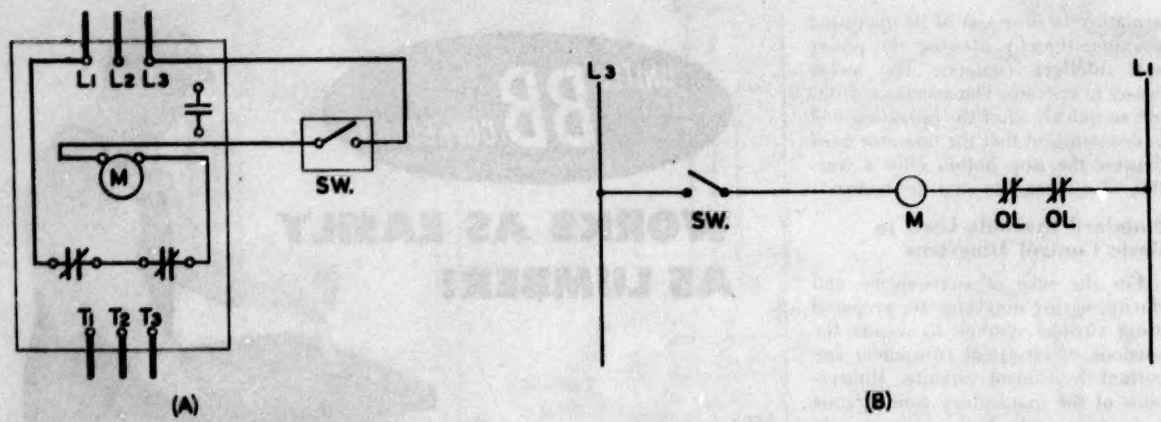

Fig. 15 — Illustrating how standard electrician's drawing and the engineer's single-line control circuit often appear side-by-side inside the cover of a control enclosure; physical layout in (A), and operating steps in (B).

shown normally closed, which is the position they normally assume.

No Voltage Protection

Up to this point, two forms of control have been indicated for a starter. Fig. 10 (A) illustrates one form which utilizes an on-off switch in the starter control circuit. Fig. 10 (B) shows the other form which utilizes a momentary contact, start-stop push-button station in the control circuit. The control with the start-stop push-button station is more commonly used.

Closing of the on-off switch in Fig. 10 (A) will start the motor, and opening the switch will stop it. If there should be a failure in power to the starter while the switch is closed, the motor will stop and, of course, the starter operating coil will be de-energized. On resumption of power, with the switch still closed, the operating coil will be energized and the motor will restart. This form of control is known as *no voltage release*,[1] or two-wire control. Latter terminology is based on the two control wires which connect the starter to the on-off switch.

[1]*Low Voltage Release* (LVR). Low voltage release is the effect of a device operative on the reduction or failure of voltage, to cause the interruption of power to the main circuit but not to prevent the re-establishment of the main circuit on return of voltage. This definition applies equally as well to Motor Circuits.

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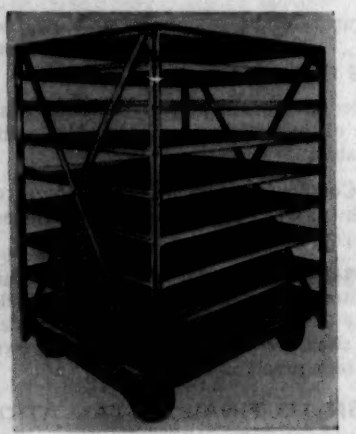

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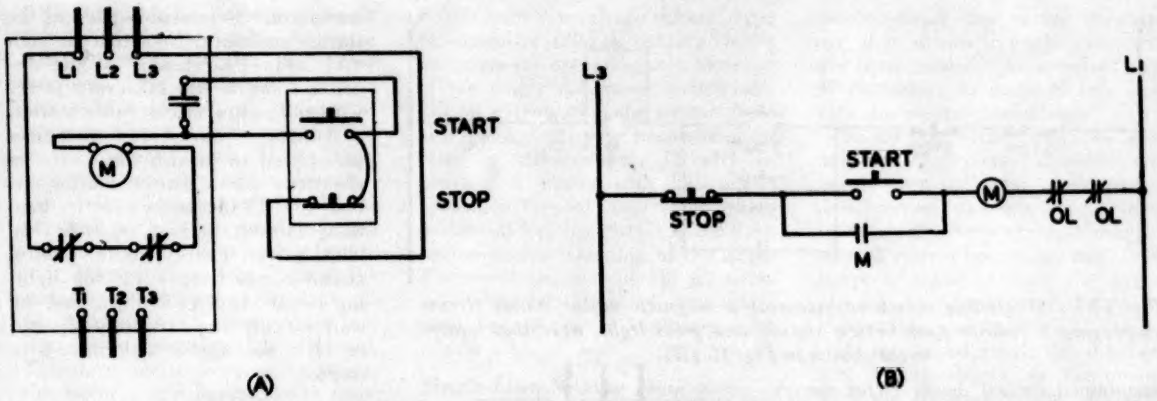


Fig. 16 — Same illustration as Fig. 15, except that this circuit employs a momentary contact start-stop push button station instead of the snap switch in Fig. 15.

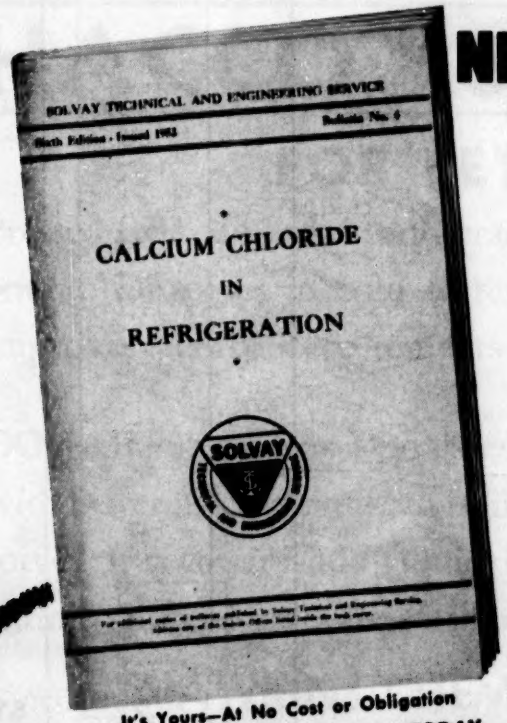
Depressing the start button in Fig. 10 (B) will cause the motor to operate. A failure in power to the starter will stop the motor and de-energize the starter operating coil. On resumption of power to the starter, the operating coil will not energize, and consequently the motor will not restart on its own. The motor can only be started again by an operator depressing the start button. This form of control is known as *no voltage protection*[2], or three-wire control (three control wires connect the starter to the push button station).

Obviously, three-wire control affords greater protection over two-wire control to personnel working around electric driven machinery, since this equipment will not automatically re-start upon resumption of power after a supply failure. Most automatically operated motors use a two-wire control, while most motors started and stopped by an operator use the three-wire form of control.

[2]Low Voltage Protection (LVP). Low voltage protection is the effect of a device operative on the reduction or failure of voltage, to cause and maintain the interruption of power to the main circuit.

Maintained Contact Stations

In addition to the momentary contact start-stop push-button station, there is a *maintained contact* start-stop push-button station. The momentary contact device is for use on a three-wire form of control, while the



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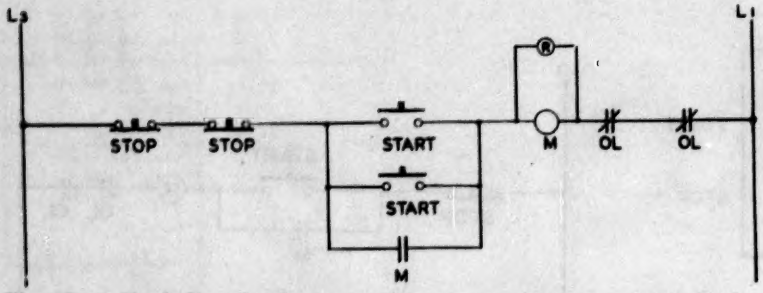

Fig. 17 — Single-line sketch representing a magnetic motor starter circuit employing a remote push-button station and pilot light, over that equipment shown in Fig. 16 (B).

maintained contact device is for use on a two-wire form of control. Its application is similar to the on-off switch. Depressing the start button will close an electrical set of contacts. These contacts will remain closed even though finger pressure is taken off the start button. The contacts will open up only when the stop button is depressed. Fig. 11 shows the symbol for the maintained contact, start-stop push-button.

Control Circuit Voltages

In many cases, owners or operating engineers of plants having motor driven equipment desire the control circuit voltages of their starters to be lower than the voltages of the electrical power supply to their motors. For example, a starter controlling 440-volt, 3-phase, 60-cycle current to a motor could have a control circuit voltage of 220 or 110-volts. Likewise, a starter controlling 220-volt, 3-phase, 60-cycle current could have a control circuit voltage of 110-volts.

For automatically controlled starters handling 440-volt, 3-phase, 60-cycle electrical power, it is often necessary to have 220-volt or 110-volt control circuits, because many control devices and switches cannot safely carry currents having greater than 220-volts. For example, most refrigeration high and low pressure cutouts, and most thermostats are not rated above 220-volts. Consequently, they cannot be wired into starter control circuits of greater than 220-volts.

Fig. 12 illustrates a starter with three-wire control handling 440-volt, 3-phase, 60-cycle electrical power, and having a 110-volt control circuit. In (A), the 110-volt source for the control circuit is furnished by a 4 to 1 step-down voltage transformer whose primary winding is connected to L1 and L3 on the load side of the starter. In this instance the transformer is mounted within the starter enclosure. An identical control system is shown in (B), except that the transformer is located outside of the starter enclosure. Note that in both (A) and (B), opening of the disconnect switch will kill every power wire and control circuit in the starter.

A lighting circuit can sometimes be utilized to furnish the source of electricity for a starter control circuit. Fig. 13 illustrates a starter handling 440-volt, 3-phase, 60-cycle electrical power. Energy for the control circuit comes from a 120-volt lighting circuit. In (A) is illustrated the starter with two-wire control, and in (B), the starter with three-wire control.

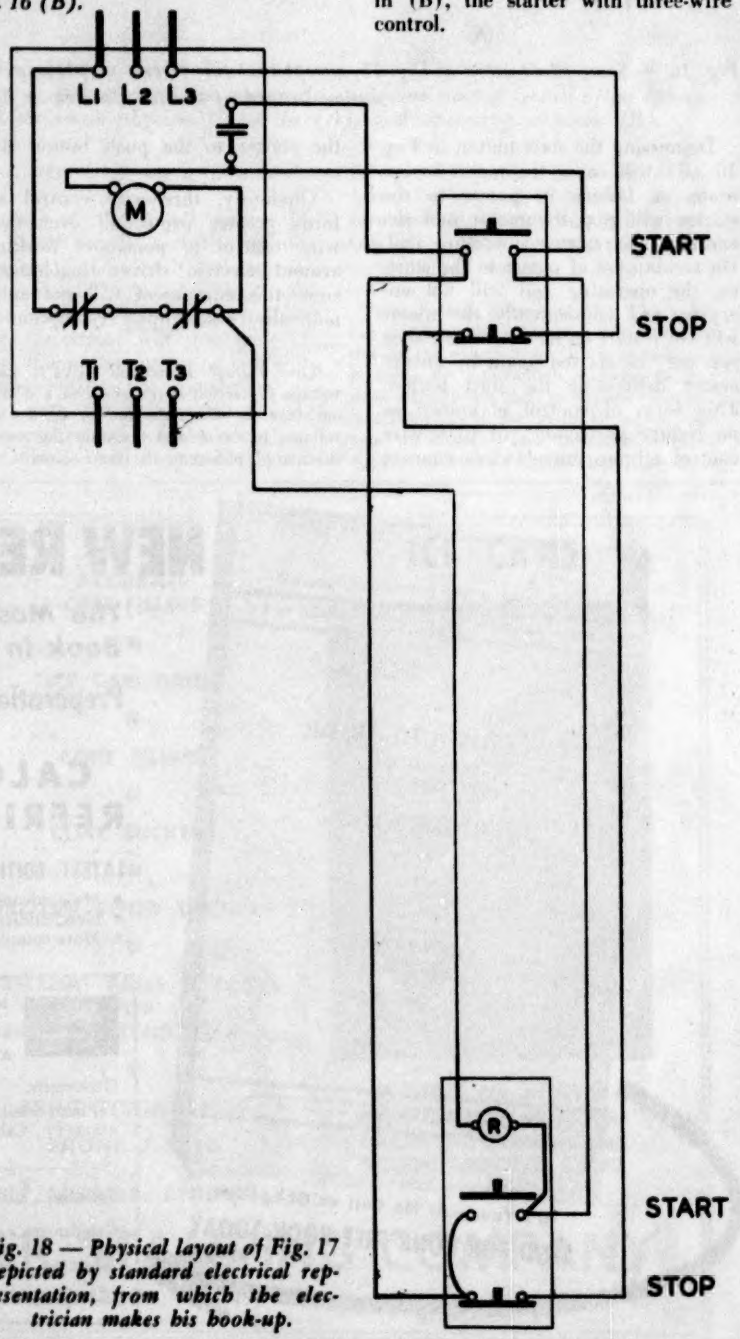

Fig. 18 — Physical layout of Fig. 17 depicted by standard electrical representation, from which the electrician makes his hook-up.

Figure 13 (B) utilizes a single pole, normally open relay having a 440-volt coil in place of the starter interlock. This arrangement permits "no voltage protection" in case of a power circuit failure or a failure in the lighting circuit. If the interlock were used in place of the relay, "no voltage protection" would be provided for a failure in the lighting circuit only. In such a case, a failure in power voltage would stop the motor even though the starter operating coil would still be energized and the starter power contacts closed. Therefore, on resumption of power, the motor would automatically start.

Service Safety Features

Note from Fig. 13 that disconnect switches are placed in both the power circuit and the lighting circuit leading to the starter. This is desirable in order that all circuits within the starter can be killed when inspection or service on the starter is required. For more complete protection to personnel working around a starter, it is sometimes desirable to kill all wires in the starter by opening up the disconnect switch in the power circuit only. In at least one state, this is a code requirement.

Illustrated in Fig. 14 (A) is a starter with "no voltage release" type of control; a 120-volt lighting circuit energizes the operating coil. Opening of the single disconnect switch will kill all wires within the starter. Note also that a single-pole, normally open, relay is utilized. Fig. 14 (B) illustrates a starter with no voltage protection type of control; also with a 120-volt lighting circuit to the push button station. Opening of the single disconnect switch will kill all wires in the starter. However, two relays must be utilized, as compared with one in (A).

Single-Line Wiring Diagrams

All wiring diagram illustrations in these articles have shown electrical equipment and wiring in arrangements which are representative of actual job installations. In other words, the relationship of equipment and wiring as shown on the diagrams was intended to be adequate enough to enable a competent electrician to wire the control circuits in the field. These type of wiring diagrams often do not readily indicate or explain the manner in which the controls function. This can become quite a problem, particularly with control systems of a more complex nature than what have been presented. For this reason, *single line wiring diagrams* are often drawn in conjunction with the more realistic or standard type of diagrams; to more clearly indicate the control operations.

Single line wiring diagrams show only control elements; no power wiring is ever indicated. Furthermore, these control elements are arranged solely on the basis of explaining the control system operation, and no attempt is made to show the proper physical relationships of the control elements to one another.

As mentioned, single line diagrams are usually drawn in conjunction with the standard wiring diagrams. When single line diagrams are used, each control element is generally labelled, and the same label also appears on the accompanying standard diagram.

Starter holding coils and interlocks are generally labelled "M", and control relays and their contacts are generally labelled "CR". If more than one relay is involved, the various relays are labelled "CR1", "CR2", etc. Starter overload heater control circuit contacts are usually shown on line diagrams as normally closed contacts with the subscript "OL" written below.

(Continued on Page 39)

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From the President's Desk

YOU CAN'T stand still; nobody stands still. The Student who quits studying not only losses his ability to study — the progressing world passes him by. The professional person who fails to keep stride with the advance of his profession, slips behind his field of service. The merchant who does not keep step with new trends fails. The artisan who fails to improve his ability loses his standing. The industrialist who ignores modernization succumbs to competition.

EITHER you move with world progress or Your World sweeps past you. "Status quo" is a dead motto. NAPRE's 46 years of progress are built on pioneering in education for the practical operating and maintenance engineer in the refrigeration industry. It behooves each and every member and prospect to take advantage of all educational facilities of NAPRE in order that he will be able to keep up with the fast developing refrigeration industry. I believe it in order to enumerate some of these education advantages of our Association:

Membership Assets

Knowledge of the fact that you are associated with some of the best nationally known operating engineers in our country;

Monthly receipt of our official publication, INDUSTRIAL REFRIGERATION;

Guy R. King's book *Basic Refrigeration* (suitable for home study if you are not near a local chapter) used as a text book by a local class instructors, free to each member;

The right and privilege to use the Question Box;

Membership in a local chapter, if there is one in your area;

Small Group class instruction under a qualified instructor, when you are a member of a local chapter;

The opportunity and privilege of attending our National Convention each year, to hear and participate in discussions relative to advances in our industry;

An opportunity to those men in the industry who have attained a high degree of competency, to advance themselves in management and supervision by taking active part in chapter work such as committee chairmanships and chapter offices. This type of self-training cannot be obtained any other way, and is of utmost value to chief engineers and managers.

Similar opportunities are offered on the national level, as members of national committees and in national offices;

Last, but not least, is the personal and fraternal association with men who share the same working environment, interests, and ambitions as yourself.

One or more of the above benefits of NAPRE membership should appeal to you, make you thankful you are a member, and also make you want to tell your friends about our Association so that they too may benefit by becoming members.

Loan Fund Committee Works

All Committee members of the Venemann Memorial Educational Loan Fund, namely, Angus M. Casberg, Ken M. Holaday, Louis P. Mantz, E. T. Quinn, Howard H. Peterson, and Addison E. Wegener, have reported on their findings regarding the operation of such loan funds in their locality. A report is under preparation and will be submitted to the Board of Directors at the next meeting. This should make it possible to put our fund in operation early next year.

Incidently, there are still a few chapters that have not sent in their contribution to the Venemann Memorial Fund. Let's hope we hear from them soon. An unexpected contribution was recently received from the Midwest Education Conference. Surplus from this successful event is thus turned back into an educational activity. The amount is approximately 15 percent of total contributions to date.

Plugs Convention Attendance

Elmer A. Johnson, President, California Chapter No. 2, NAPRE, has asked that a part of this page be devoted to inviting all members and readers of this magazine to Los Angeles, November 8, 9, 10. National and Local committees are planning a completely rounded educational program. At least one presentation will be on each of the major branches of our industry. And they will be by the top flight men in the field. A choice of field trips will be offered so that each member can choose the one he thinks will be of the most benefit to him. An idea of the quality of these trips is given in a by-lined article by S. Averell Cole, in this issue.

Entertainment committee chairman, Ed Nelson, has pulled out all the stops and has the lion's share of the budget. He has plans that will surpass anything we have seen before. With all the wealth of talent and show places at his disposal here in the entertainment capitol of the nation, there is no reason that he should not be able to outdo any previous convention. *We challenge you to come to Los Angeles and see that he does!*

New Orleans Film Circulates

Larry Benedict's fine convention film continues to receive compliments. Alvis J. Clay, Past President, writes from Memphis: "May I suggest when this film comes to your chapter that all members and friends see this feature, for I am sure it will make you feel close to your National Officers, Educational Chairmen, and Exhibitors. You may also find a better way that you can serve NAPRE. This excellent Chapter — National relations media hits the home stretch in September and October. Here is the schedule:

	Sept.		Oct.
Indianapolis	1	Stockton-Modesto	4
Twin Cities, Minn.	7	San Jose	10
Chicago	13	San Francisco	12
Kansas City	16	Sacramento	18
Dade County, Fla.	20	Fresno	31
Denver, Colo.	27	Colton	(Nov.) 2

Chapter Reports Cited

If NAPRE handed out decorations for a job well done, it would have been my pleasure to recommend the chapter scribes or correspondents. Reports from our chapters are very essential, from an administration point of view. National officers, through these regular communications, keep their fingers on the pulse of the units in our Association.

Of all such citations merited this year, top honors should go to John Grainger, Seattle. John came in as a pinch-hitting Secretary, was held over in the job by the members, and also writes the Chapter report monthly for IR. Without coaching, he has caught on to the idea of reporting worthwhile educational matters for the benefit of all, through the columns of our official organ. Look his report over in this issue. See if you too, get considerable information from Grainger's synopsis of another person's presentation.

Regis Enbeer

News Notes and Chapter Activities

Seattle

JOHN GRAINGER

ON MAY 19, speakers for the evening were Thomas A. Gorgford and Robert B. Jaeger, Jr. of the Bearing Sales and Service Inc., Seattle, who showed slides and gave us a talk on ball and roller bearings, their maintenance and care. The slides showed the correct manner of taking off a bearing. This should be done with a pull and not by using a hammer and tapping. The pull should grip the inner race; i.e. against the shaft. If a pull is not available then the shaft should be placed in a vise, with soft grips, and the shaft then driven down out through the bearing.

Extreme care is necessary in the handling of a new bearing. Cleanliness is of the utmost importance. Hands should be clean and the bearing kept clean throughout the entire procedure. Manufacturer's directions should be followed in the cleaning and packing of the bearing. In putting on a new bearing a press should be used, which exerts an even pressure all around in forcing the bearing into place. If a press is not available, then the bearing should be placed over a vise (with soft grips) the bearing resting on steel shims which are against the inner race, and the shaft tapped down through the bearing.

The slides also showed how the balls are put into the bearing. All the balls but one are placed between the inner and outer race, then to insert the last ball the outer ring is slightly distorted in a special press fixture. At a critical point, far short of the elastic limit of the ring, the last ball drops into place. Finally the two halves are riveted together in a special machine.

Every anti-friction bearing consists of four basic parts: an outer ring, an inner ring, the rolling elements, and a cage which keeps the rolling elements properly spaced out between the rings. The rolling elements can be either balls, cylindrical rollers or spherical rollers. Cages may be steel, brass, bronze or phenolic composition.

Anit-friction bearings are designed to support a radial load or an axial load. Ball bearings will take up an axial or thrust load and a radial load, but cylindrical roller bearing will support radial load only. Radial load is that force which is at right angles to the shaft and axial load or thrust is that load which is exerted parallel to the shaft. Two other bearings, the ball thrust and the spherical roller thrust bearing will support thrust load only. Where there is any question of misalignment then the self-aligning ball bearing can be used, this bearing consists of two rows of balls rolling on the spherical surface of the outer ring, compensating for angular misalignment.

Detroit

LEO GAGE

THE feature of our June 14 meeting was a lecture given jointly by Vin Bower, sales representative, Frank Versagi, chemist, and Bill Parker, laboratory supervisor, of the Mueller Brass Co., Port Huron on the subject of Acids in "Freon" and their removal with Silica Gel, etc., with demonstrations. Mr. Bower gave a brief talk on driers and the formation of acids under various circumstances or conditions in "Freon." This was followed with a demonstration by Mr. Frank Versagi, chemist who had a small laboratory replica set up with various gauged glass tubes, and chemical agents for detecting the acids, neutralizing them, etc. Mr. Versagi's demonstrations were unusual inasmuch as the results taking place, or which usually take place, could be visually observed by the practical tests he performed in open view. Many questions were asked which were ably answered by these three men.

This was followed by the showing of a movie which was taken by Larry Benedict, of the National Public Relations Committee, at the last National Convention in New Orleans which also included shots taken in Los Angeles where the convention will be held this year. The movie also included some shots of scenery taken from the train, views of Chicago and other cities while on the way to the convention, and views of Texas, etc. taken on the way back to Los Angeles. The views taken in New Orleans proper during the convention

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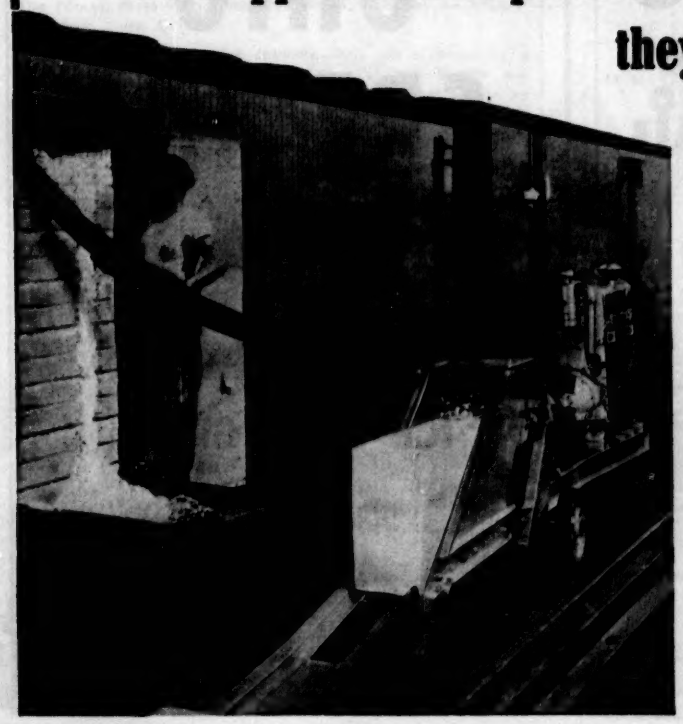

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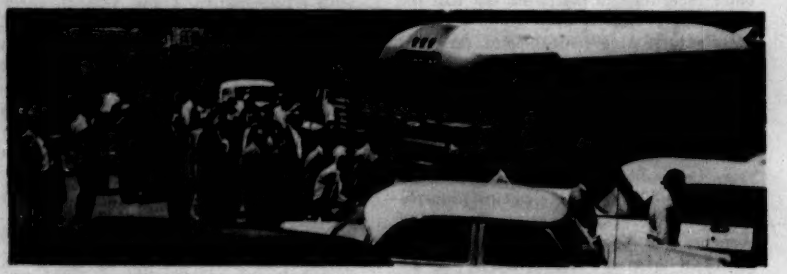
showed various sections of the city including the Old French Quarter, the exhibits at the hotel and the national officers and board of directors. A prominent individual shot in the Board of Directors group was that of our own smiling Roy T. Burns. This was the first motion picture we have had of this type.



Members of Michigan Chapter No. 1, NAPRE, Detroit, alighting from chartered buses at Dow Chemical's Midland, Mich., headquarters for the field trip in May.

Large portion of the Detroit membership poses outside the Dow auditorium after briefing by company officials regarding the scope of the visit.

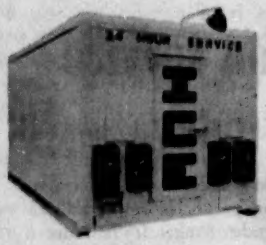
Los Angeles

FRED HERR

AN SRO crowd of members and guests thronged the conference room, Terminal Club, June 1, to hear Frank Hibbs, Jr., assistant chief engineer, Associated Refrigerating Engineers, Los Angeles, address the Chapter on "Vacuum Cooling Plants", a subject of major interest to West Coast refrigeration engineers.

Mr. Hibbs' talk consisted of technical descriptive commentary on slides depicting vacuum cooling installations in various sections of California where he and Ed L. Nelson, Union Ice Co., had collaborated in making colored photographic records of the various applications of vacuum cooling plants in the celery growing country around Salinas, San Francisco, and other sections of the state. Prior to presenting the slides, the speaker gave a brief review of the development of vacuum cooling. He declared that vacuum cooling today finds its primary use in the vegetable industry. Major installations are in California and Arizona.

Work on developing this method of cooling, Hibbs pointed out, was started about eight years ago by the Vacuum Cooling Company near Salinas. It took a long time, he said, to get the vegetable industry interested. Steam jets, he said, were originally used in vacuum cooling installations. By 1951, the first mechanically operated vacuum cooling plant was installed using refrigerated coils and vacuum units instead of steam jets.



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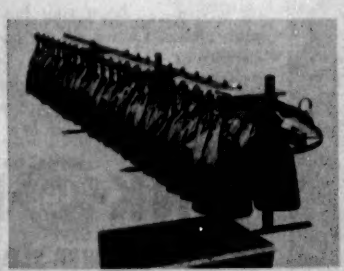

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The speaker traced the development of the process from half car lots only to current techniques which permit vacuum cooling plants to handle full railroad car installations; steam jet, ice-fired, round and square-shaped machines. Ed L. Nelson handled the projection machine.

Chapter President Elmer A. Johnson initiated three new members at the business session: C. A. Roberts, operating engineer, Anheuser-Busch Brewing Company, Van Nuys, Calif.; William J. McCarthy, Metro-Goldwyn-Mayer Studios, Culver City; and Howard C. Jones, Pacific Fruit Express, Los Angeles. T. W. Berg, plant engineer, Union Ice Company, Ventura, Calif., brought four of his assistants to the meeting to hear the talk on vacuum cooling. Membership Chairman Frank Muzzi reported on plans to keep the membership drive alive during the summer months when no meetings are held.

Basic Electrical Controls

(Continued from Page 35)

Fig. 15 (A) shows the standard wiring diagram for a starter having two-wire control. Figure 15 (B) is the line diagram explaining the control operation of (A). The explanation given by (B) is that current flows from L3 to L1 through starter operating coil "M" whenever "SW" is closed. Naturally, operating coil "M" is energized whenever current flows through it, which causes the starter to close and operate the motor. Opening of "SW" breaks the circuit to "M", causing the starter to open and the motor stops.

Standard wiring diagram for a starter having three-wire control is pictured in Fig. 16 (A), and (B) is its corresponding line diagram. The explanation from (B) is that current flows from L3 to L1 through starter operating coil "M" when the momentary start button is depressed. When operating coil "M" energizes, interlock "M" closes and the current still passes from L3 to L1, even though the start button may no longer be depressed. Depressing the stop button opens all circuits to operating coil "M" and it becomes de-energized.

Control Designer Starts On Single-Line Wiring Diagram

Single line wiring diagrams are also commonly used to aid in the initial designs of control systems. In many instances standard wiring diagrams would be extremely difficult to prepare without first resorting to the single line wiring diagrams.

For example, Fig. 17 represents a "no voltage protection", or three-wire type of control for a starter having two push-button stations. One push-button station is in the normal location close to the starter, and the other push-button station is located a considerable distance away. The remotely located push-button station is equipped with a red pilot light which shines whenever the starter operating coil is energized. This latter provision enables the operator to know whether or not the motor is in operation.

This control system is design so that the motor can be started or stopped from either push button station. Note from Fig. 17 that operating coil "M" is energized if either of the start buttons is depressed. The red pilot light will shine whenever the operating coil is energized since it is wired in parallel to it. Depressing either stop button will de-energize the operating coil and stop the motor.

Fig. 18 is the standard wiring diagram which was drawn after referring to Fig. 17. It is apparent that the control operation is much more difficult to follow in Fig. 18 than in Fig. 17. Yet Fig. 18 shows the proper physical relationship of equipment and circuits to each other, and can be used by an electrician to wire in the equipment.

ESKIMO Ice Crushers

The Finest, Most Economical Crusher Built Today — With Real Low Snow Content.

250-P CRUSHER—This unit is driven by a special combination of Two V-Belts and chain drive shown in the inset picture by a ¾ HP motor. Made from heavy steel plate, heavily zinc coated, self aligning ball bearings. The 50 lb. hopper opening is 12" x 13½" and also has a platform for easy loading. Drum size, 8" x 12"; height to the loading platform 47"; floor space required 31" x 32½".

Bag loading chute available at small additional cost.

You may get this motor in either 1 phase or 3 phase, 110/220 or 220/440 volt motors.

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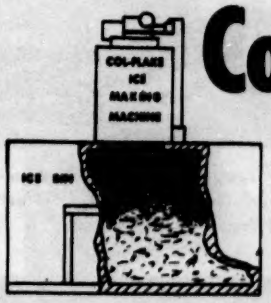

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LIMITED TIME OFFER

Complete with F12 Refrigeration and electrical controls

Up to 1 ton $1,750.00
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Above prices are f.o.b. Chicago, complete installation data. Supplied storage bin not included. Bin prices upon request.

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Name .....
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I require ..... tons of ice per day.
Please have engineer call ☐

Convention Group Recommends Vocational Sight-Seeing Trips

S. AVERELL COLE
National Publicity Chairman
National Association Practical
Refrigerating Engineers

CONVENTION Publicity Chairman Larry Benedict allowed the Entertainment, Golf and Acommodation Committees to run rampant in July INDUSTRIAL REFRIGERATION, with their "Camber of Commerce' stories of the Golden State, and Los Angeles in particular, as an inducement to NAPRE members and guests to plan on the November 8-10 Convention at the Los Angeles Ambassador Hotel. Dean Harold P. Hayes, NAPRE Educational Chairman, and his erstwhile assistant, Los Angeles' own Prof. Guy R. King, hastened to direct Larry's attention to the educational advantages offered by plant visits in the Southern California and Arizona areas.

General Chairman Wm. Ray Burnett sided with the educators. He pointed out the recent Chapter field trip to Anheuser-Busch Inc. plant, last year's trip to Shell Oil Co.'s NH_3 unit, and many other unique and modern installations. Dean Hayes, who has had considerable experience with vacuum pre-cooling plants, stated that the Education Committee would gladly arrange any pre- or post-Convention trips requested.

Vacuum Cooling Plant Trips

Cited by the Committee were 16 vacuum produce cooling plants built by the Gay Engineering Co., Los Angeles. Chester R. Anderson, Chief Engineer, Gay Vac Div., when interviewed, related some of the following facts:

"Each plant has from two to four tubes each, and one plant has two tubes that take the entire loaded refrigerator car into the tube. The usual tube is designed to handle 320 cartons or half car of lettuce at approximately 45 lbs. per carton or a total loading of approximately 14,400 lbs. Operation time involves only 25 minutes, which averages approxi-

Credit illustrations: Figs. 1 & 2—Courtesy Gay Engineering Co. Figs. 6 & 7—by Owens-Corning Fiberglas. All others, courtesy Worthington Corp. and "Budweiser."

Fig. 1 Vacuum Pre-Cooling tunnels (tubes) which accommodate an entire railroad car, eliminating former forklift and conveyor loading operations.

Fig. 2 Five two-stage vacuum pumps typical of Gay-Vac installations. NAPRE member Chester R. Anderson, Gay's Chief Engineer, poses alongside his project.

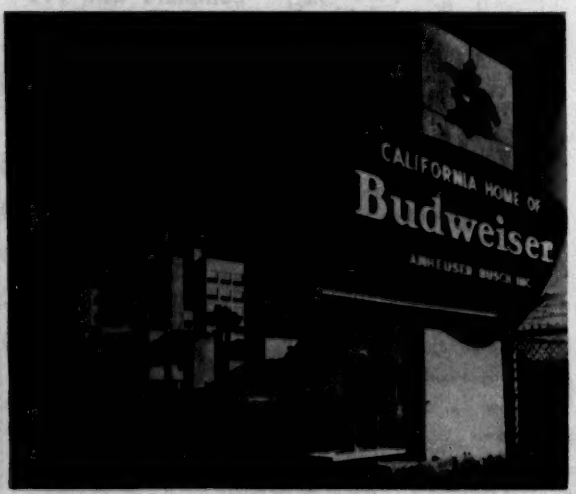


Fig. 3 New 20 million dollar brewery on the field trip list for NAPRE's 46th Convention delegates.

Fig. 4 Entrance to Anheuser-Busch, Inc, Los Angeles, plant. All buildings, with exception of the brew house, are one story.

Fig. 5 Refrigeration Compressing Units at new Budweiser plant. Motors are 500 hp synchronous by Electric Machinery Co.

mately one and one-quarter cars per hour at 640 cartons of lettuce to a standard refrigerator car."

Anderson explained produce precooling with a lettuce example: Lettuce is packed into the cartons in the field, using field labor and loaded on pallets, each pallet holding 32 cartons. Trucks convey the carton pallets to the vacuum plant where forklifts unload and place them on a dolley which holds 10 pallets, or a total of 320 cartons. A forklift pushes the loaded dolly into the vacuum chamber after which the doors closed and rotary two-stage vacuum pumps are started. Approximately 6 minutes is required to reduce pressure to vaporization point, and from this point an additional 12 to 16 minutes will reduce product temperature to 33 F.

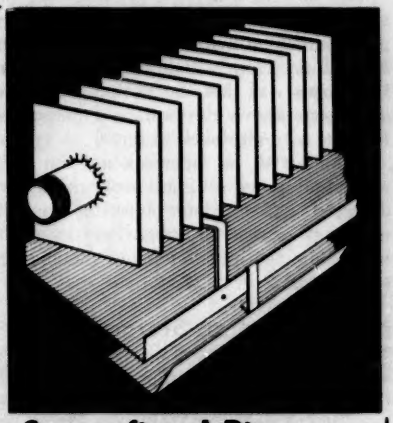
According to Anderson, member of Calif. No. 2, NAPRE, precooling time depends on initial temperature and weight of product. After product has been precooled, the dolly is taken out from opposite end and placed along a belt conveyor where the cartons are unloaded. The conveyor carries them to the pre-iced refrigerator car for loading.

Time And Cost Figures Given

Chilling of full-loaded railroad cars, previously reported in INDUSTRIAL REFRIGERATION, appealed to the imagination — so the interview covered that topic. The full loaded refrigerator car is placed into the tube with doors open (see Fig. 1) and precools at the same rate as the half car dolly, according to Brother Chester. This has some advantage in that there is no rise in temperature, as the product is not subjected to

(Continued on Page 45)

This new finned pipe is available in lengths of 5', 6'8", 10' and 20' — and with fin spacings of 1" and 1½" — to fit every application.



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Square-finned Pipe

Is ideal for cold storages, freezers, food processing and meat packing plants, etc. Manufactured from 2" dia. F.W. steel pipe and 7" square 14- gauge fins, Frick finned pipe gives maximum heat transfer per dollar invested. Each fin is bonded to the pipe under tons of hydraulic pressure. All assemblies are hot-dip galvanized.

These new Frick finned coils require only one-quarter of the space needed for bare pipe having the same surface. See your nearest Frick Branch or Distributor for complete details, or write for Bulletin 158.

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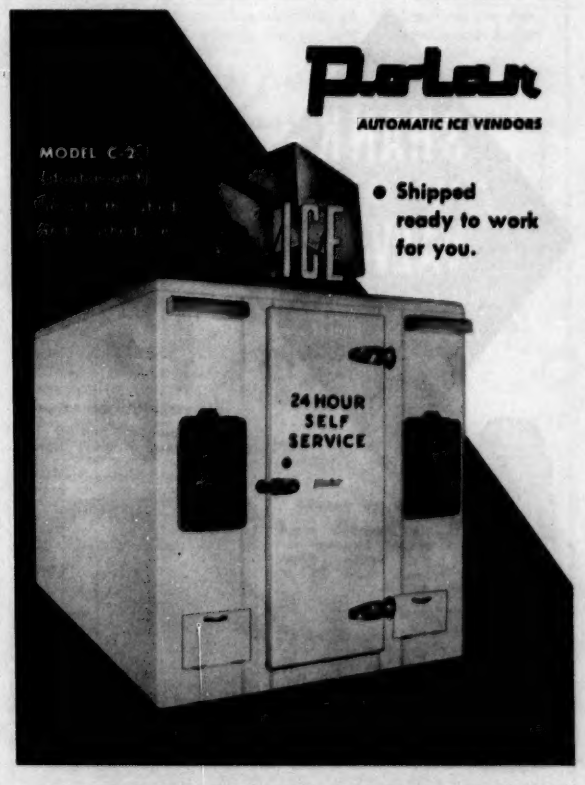

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A CENTURY
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with automatic shut-off of liquid in case of glass breakage.
RELIEF VALVES
for Ammonia and Freon. Positive relief action. Pressures from 75 to 300 lbs.
Largest line of Ammonia All-Steel Bar Stock Valves in the industry. Completely Cadmium plated.
STOCKED BY LEADING JOBBERS
Write for Catalog and Prices.
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Packers Study Lack of Space in Frozen Food Retail Cabinets

PACKERS and other segments of the frozen food industry are concerned about the lack of space in frozen food cabinets in retail stores. In the face of greater consumer demand for existing products and with many new products being introduced every month, this shortage is assuming the proportions of a major bottleneck. No one, least of all the packers, expects that retail grocers can continue adding more cabinets of existing design and capacity. There simply isn't that much floor space.

Last month president George Mentley of the National Association of Frozen Food Packers decided that the only solution was to find a way to increase the capacity of frozen food cabinets without increasing the amount of floor space they occupy. He appointed a special committee (Cabinet Task Force Committee) to come up with a solution.

The committee met in New York June 16. Facing the tough problem in a climate of optimism the committee:

1. Agreed that present cabinets are inefficient, perhaps overly fancy.
2. Agreed that retail stores should be the ones to decide what they need, what they want, and how much they can afford to pay for new cabinets.
3. Voted to assume the task of designing the cabinet of tomorrow.
4. Voted to spearhead a drive to raise funds to finance development of the new designs.
5. Admitted that some retailers might hesitate before making a sizable investment in new cabinet designs, agreed that the packers would probably fall heir to the big selling job.

Key man in the program probably is Frank Penn, vice president and general production manager of Minute Maid Snow Crop Div. A graduate engineer (MIT), Penn was assigned the job of conducting the retail store survey and coming up with the general specifications for a skeleton cabinet from which equipment engineers could start. Consensus was that the design would have to utilize the air space above the square footage assigned to frozen foods (i.e., multi-level cabinets).

Refusing to be sidetracked from the immediate goal of designing and selling a new cabinet style, the committee deferred until a later meeting consideration of other means of increasing frozen food sales, such as developing more efficient merchandising methods and better use of existing space in retail stores.

New Canadian Storage Plant

PLANS for immediate construction of a large cold storage plant on the north side of Regina, B. C. Canada have been announced by Trans-Canada Freezers, Ltd. of Calgary and Edmonton. The plant, to be erected by Northwest Dredging Co. of Vancouver, is expected to cost $400,000. It is designed to offer cold storage facilities to wholesale meat companies and to farmers and businessmen.

Central Power & Light Sells Texas Ice Properties

ALL ICE properties of Central Power and Light Company throughout south Texas have been sold to Southern Texas Ice & Service Inc. Announcement of the sale was made jointly by J. L. Bates, C P & L president and general manager, and E. W. Franke, vice president and general manager of the ice and service firm. Sale price was not disclosed. The ice company has been operating the 33 plants under a lease agreement since 1953.

High Level Business Activity Outlook

PROMISING signs on the nation's business horizon point to continued high-level activity through the second half of 1955, the Federal Reserve Bank of Chicago reports. Likely to buoy up the economy in July-December period, the bank says in its monthly review, are important sources of strength now present on the business scene. Among these upward forces are:

1. Increased business spending for new plant and equipment. According to a recent survey, outlays by late summer will probably run 10 per cent above the first-quarter seasonally adjusted rate.

2. Low business inventories relative to current sales. In a recent month, stock on hand had climbed only one per cent above last year's low, whereas total sales were up 12 per cent in the same comparison. Larger additions to stocks in the months ahead, the bank says, may provide an added stimulus to the over-all business picture.

3. Increased levels of employment and income. After a slow start, the number of wage and salary workers has climbed 1.2 million from last summer's low. A longer work week, higher pay and the increased number of jobholders pushed midspring wage and salary income to about five per cent higher than a year earlier.

Combined sales of furniture, TV sets, refrigerators, washers, dryers, sewing machines, carpets, linoleum and curtains at department stores climbed 11 per cent over a year ago during the first five months of 1955. In contrast to this performance, retail furniture and appliance store business rose only 7 per cent. Among the home-furnishings lines, sales of major household appliances, such as refrigerators, washers, and dryers, have shown the most spectacular gains. Household appliance sales in the January-May period ran about one-third above the same months last year in both the Midwest and the nation.

The nation's current boom in business mergers differs from previous such waves in at least two "vital" respects, the review states. First, the volume of mergers—which typically rises with business activity—is low relative to earlier periods of prosperity. Despite a substantial increase in the number of firms in existence, the current merger rate is only one-third that of the late Twenties. Second, diversification, rather than market domination, is a major goal of corporate mergers today. Far from attempting to monopolize particular industries, most promoters of mergers either hope to stabilize profits by combining with firms in dissimilar lines or to improve their chances of survival in an increasingly competitive field. Other reasons include the economies associated with large-scale operation, the addition of product lines in order to help stabilize production and employment, and the acquisition of better distribution channels.

The Bank also points out that auto production and home building are likely to hold to higher levels than was anticipated at the beginning of 1955. For one thing, both industries have continued to do very well. Auto sales are running at a record pace. In addition, dealers inventories, which had been rising rapidly through midspring, have recently tended to level off. Stock on hand amounts to about one month's supply at the current rate of sales.

During the first half of this year, business throughout the nation has been marked by broad and continuous expansion. Well below previous peaks at year-end, most measures are now pushing into new high ground. Industrial production has gained more than 6 per cent since the end of 1954. Total national output of goods and services is currently close to a 375 billion dollar annual rate, more than 5 per cent above last summer. Retail sales, too, have been running exceptionally strong in recent months.

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COLD ROOM LOSS

with . . .

AIR-LEC DOOR OPERATORS

Air-Lec, shown installed above the cooler door, opens and closes the heaviest doors quickly, safely and smoothly at the touch of a switch or the light pull of a cord. Available with Mechanical Trip for one or two operating stations above each door approach, or with Electrical Switch for more and distant stations. Air-Lecs are in use in thousands of factories, food freezing and storage plants, meat packing companies, garages and service stations.

Speed and Safety are characteristic of Air-Lec because Air-Inertia-Spring, all elastic forces, are the patented forces used.

AIR-LEC FOR TYPICAL COOLER DOOR. . **$65.00**

. . . AND AIR SEAL

Installed at left of door in illustration, the Air Seal operates in conjunction with Air-Lec, to provide an absolute seal on cooler doors. Air Seal crowds the outer edge of the door to stop improper circulation and frosting. Air Seal is especially desirable where temperatures below freezing are maintained.

AIR-SEAL. $25.00

NOTE HOW THEY RE-ORDERED AIR-LECS

	Recently Ordered	Now Enjoy
Continental Freezers of Ill. Chicago, Ill.	1	10
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Williamson Storage & Ice Co., Inc. Williamson, N.Y.	3	6
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Fill in and return the coupon today for complete information.

SCHOELKOPF MFG. CO., Madison, Wis.

Cooler Doors are ___ Ft. Wide, ___ Ft. High. Air Pressure ___

Open Toward Warm Side, Cold Side.

Firm Name _____

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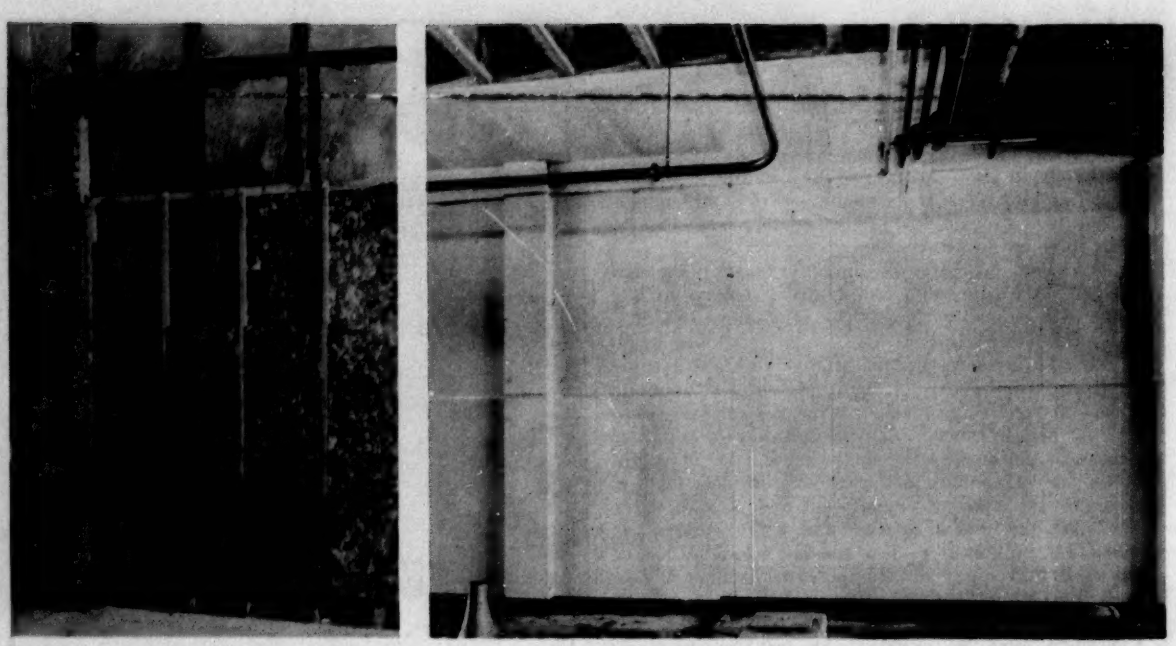

Figs. 6 & 7 — Dry-wall construction employed at the new Los Angeles brewery is illustrated here. The concrete wall was sprayed with insulation adhesive, a water-base asphalt emulsion which is non-flammable. When the preparation was dry, aluminum foil, .003-inch thick and 36-inches wide, was rolled into the adhesive and pressed on. Furring strips were installed and the first layer of two-inch thick preformed Fiberglas insulation pressed between them. More furring strips were installed to contain the second layer of Fiberglas providing a total thickness of four inches. Three of the steps are shown by small photograph. Finish of cement asbestos board over the insulation is pictured at right.

BATEMAN MONARCH
All-Steel ICE CRUSHER

Grinds 50-LB. Block of Ice in Six to Ten Seconds

The Monarch Heavy-duty Ice Crusher is galvanized for the prevention of rust. Slant hopper for easy loading, with shelf for placing ice on before entering the crusher. Hopper opening — 12½" x 15". • Four grate adjustments for sizing ice from pea to 1¼". • Chute for filling bags or containers. • One piece grate for fast sizing of ice and easy adjustment.

• 1-HP. Motor with double V-Belt Drive for sure pulling power. • All moving parts move on either ball or roller bearings. Gears are of alloy steel hardened for long life and trouble-free service. Gears are in an enclosed gear box and run in grease. Bearings run in grease. • No leakage. Steel shell, legs, grates, grate handle and allow steel teeth. Guard covers flywheel and motor pulley. Belts and pulley furnished when crusher is ordered without motor. Side plates and bottom of hopper 3/16" steel.

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(Motor at prevailing price.)
(Shipping Weight 320 lbs.)

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Water conditioning problems are individual, too . . .

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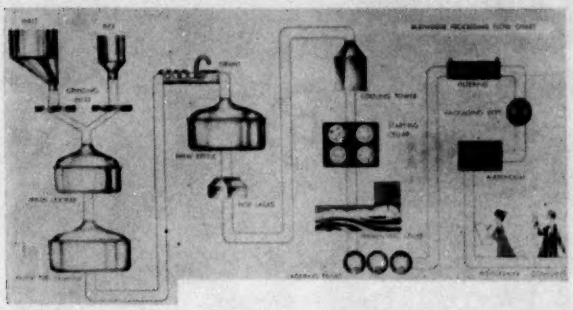


Fig. 8 (Above) Flow chart of brewing process at "Budweiser". Refrigeration is used in the cooling, starting, fermenting and lagering stages.

Fig. 9 (Right) View of kettles in brew house at Anheuser-Busch, Inc., Los Angeles.

(Continued from Page 41)

picking up heat on its way from tube to the refrigerator car. There is no handling after car has been precooled and towed out of the tube; the doors are sealed and ready to move to the market.

The Gay-Vac vacuum cooling plants use rotary type two-stage vacuum pumps (as illustrated in Fig. 2) capable of producing a vacuum to within two mm. Hg. (0.04 psi) of Absolute. Mechanical refrigeration is utilized for the water vapor condenser, primarily using ammonia as a refrigerant as all plants installed to date (excepting two) have been connected to existing ice plants. Using the condensing side only, this practice allows ice plants to continue making ice when not vacuum cooling. Surplus refrigeration is often used, depending on refrigeration equipment available. Water vapor is trapped within the vacuum system and drained to waste between cycles.

Referring to a question on cost of operation, Anderson replied, "We do not have too accurate figures. However, most of our customers have come up with a cost of between $25.00 to $30.00 per car of lettuce, depending on labor costs and remote product loading conditions."

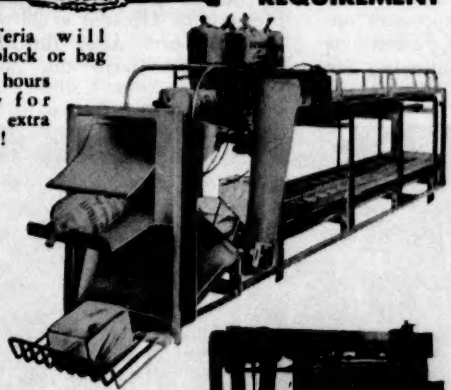
Many Brewery Invitations

Milwaukee has nothing on Los Angeles these days in the number of leading breweries. In addition to many modern West Coast independents, three firms of international fame (two from Milwaukee) recently lo-

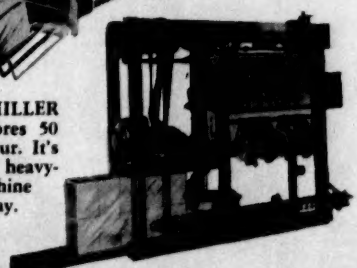
ICE-A-TERIA

ICE VENDORS FOR EVERY REQUIREMENT

Ice-A-Teria will vend block or bag ice 24 hours a day for those extra SALES!



Perfection-made MILLER 300 lb. model scores 50 tons of ice per hour. It's the lowest priced heavy-duty scoring machine on the market today.



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SCORING MACHINE PARTS AVAILABLE FOR IMMEDIATE DELIVERY

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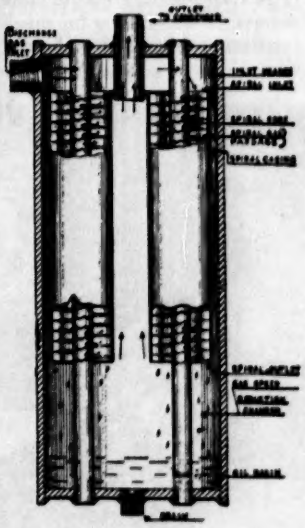

STOPS OIL FROM ENTERING CONDENSER RECEIVER AND LOW SIDE

Allows operation as was originally intended. Simple in operation — no parts to wear out — no screens, metal wool or any close screens to clog, raise discharge pressures and cut down capacity.

When used in connection with air compressors, water is also separated with the oil.

Made in 12 sizes, ½" to 6".

Built for years of trouble free service. Mechanical details on request.

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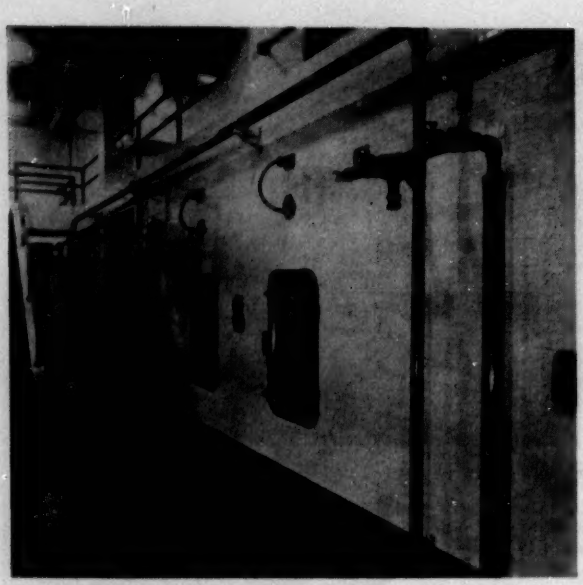


Fig. 10 Patented Bosari fermentation cellar. Tanks are located behind tile partitions. CO_2 recovered from this process, is purified and used for carbonation.

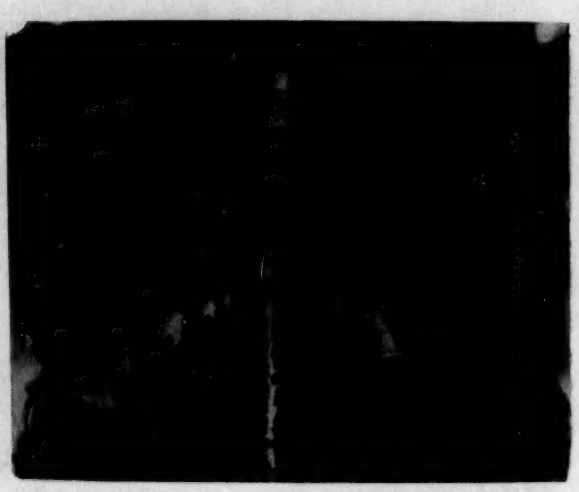


Fig. 11 Krausening tanks in lagering cellar. One million barrels of beer (300 million pint bottles) move through these tanks annually.

cated new plants in Los Angeles County. Attendants at NAPRE's 46th annual meeting need not be 19th hole (Golf) addicts for enjoyment of that "rope yarn" Sunday. Visitors to the local breweries are always welcome, and arrangements along that line are intended.

To further entice the member who prefers his 7200 (plus) yards of exercise in the line of a "postman's holiday", to that of roughing it along fairways, blasting out of miniature deserts, or skin-diving for misdirected synthetic rubber pellets, here's a preview of things to come:

Four Worthington refrigeration compressors with a total capacity of 1660 tons of refrigeration have been installed in the new $20,000,000 Anheuser-Busch "Budweiser" brewery in Los Angeles, California. To get an idea of just how much refrigeration this represents, figure that an average fully air conditioned home requires about three tons of refrigeration per 24 hour period. On this basis the brewery's four compressors operating at air conditioning conditions could provide air conditioning for about 1000 homes. Aside from the brewery itself the equipment provides air conditioning for all the offices, the dining room, the bottling shop, and the administration building.

According to Fred P. Hagee, St. Louis, Missouri, Worthington representative, who filled in these facts, the installation consists of four Worthington 15¼x15¼x19 horizontal duplex single stage compressors, each driven at 225 rpm by 500 hp engine-type synchronous motors. Each machine has a maximum capacity of 535 tons at 45 psig suction pressure, or 415 tons at 25 psig suction pressure. Also, furnished by Worthington, were the horizontal

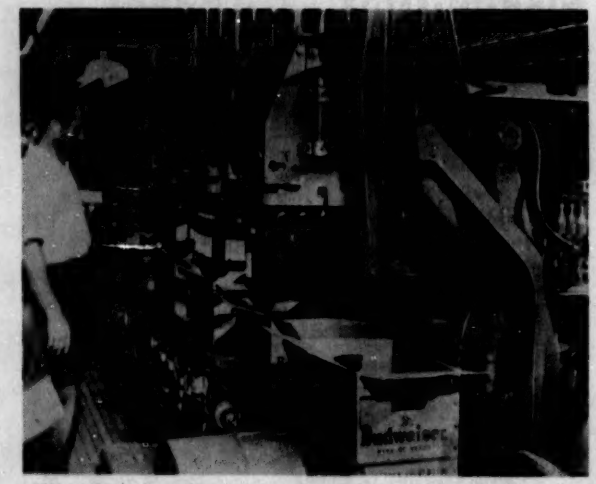
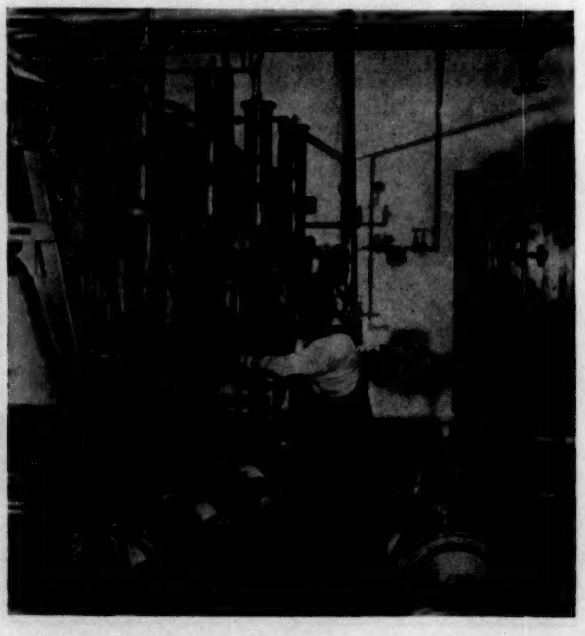


Fig. 12 (Above) Automatic machinery plays a big part in modern brewing and bottling. Here a machine loads three cases simultaneously.

Fig. 13 (Right) Draught beer is still popular. Here a brewer operates a four-line filler.



shell and tube condensers, receivers, and accessories such as seal traps, mechanical separators, etc.

At the present time production is geared to ship 1,000,000 barrels of beer annually. This is equal to almost three hundred million bottles of Budweiser Beer. It is interesting to note that approximately 90 percent of production goes out of the brewery in bottles or cans, the remaining 10 percent in barrels.

All One Story Structures

With the exception of the brewhouse, the nine separate buildings of the Los Angeles plant are one story and constructed of reinforced concrete. There is good industrial philosophy behind this type of construction. A one story structure is simple and allows the greatest degree of flexibility for expansion and production control.

A new and improved method of temperature control in refrigerated buildings was employed in construction of the brewery. As further developed for Anheuser-Busch, the "dry wall" method permitted erection of wall insulation without use of hot asphalt and its attendant dangers, and provided for use of a practical interior finish of cement asbestos board. This construction makes it possible to remove any wall section and salvage all of the insulation and finished surface materials. For this reason, alterations can be made with greater economy, and repairs to either vapor seal or finished surfaces can be made readily. A total of 1,307,579 board feet of Fiberglas insulations — weighing approximately 1,250,000 pounds was installed in the stock and Borsari cellars and brewhouse.

The brewery was designed by Holmes & Narver, Inc., and constructed by the Peck-Cahill Company, both of Los Angeles, under the direction of the Anheuser-Busch, Inc., Engineering Department, John Kenneth Hyatt, Chief Engineer. The fermenting tank building construction was by Bosari Corp., N. Y., under the direction of E. Pichel, vice-president.

Other Trips Offered

As previously noted, inspection trips to most any type of installation can be arranged. If you want warehouses or refrigerated ships, office buildings or air conditioned candy plants, bakery or dairy, or fish freezing tour, you name them. Los Angeles Chapter will do the rest.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

Asks Inhibitor Suggestions

QUESTION NO. 1064: In January '55, page 41, Question No. 1032, in the final paragraph of an answer on "Bulging Ice Cans" you will see the reference "use an inhibitor to prevent corrosion." We in Australia have tackled this problem of corrosion from many directions, starting with pH control and the employment of various subsequent treatments. But have you a firm recommendation as to the best inhibitor which can be used?—N. K. General Secretary, Ice Mfr's. Assn., New South Wales.

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ANSWER No. 1: The Calcium Chloride Institute Washington, D.C., which is responsible for research and distribution of information relative to calcium chloride brine, can be quoted as follows:

"The most effective of this type of material is a soluble chormate salt such as sodium chromate. Sodium chromate is a neutral salt and may be used where it is not desirable to change the pH of the brine. It is believed that the presence of a very small amount of the corrosion inhibitor causes the formation of an extremely thin protective layer on the metal. This film while probably only a few molecules in thickness, is thought to consist of a mixture of chromium and iron oxides in hydrated form. In any event, the film is believed to resist the solution tendency of the metal . . . and thus retard corrosion.

"The benefit to be obtained from use of sodium chromate as a corrosion inhibitor in refrigerating brine has been proved quite definitely. An investigation sponsored by the American Society of Refrigerating Engineers has demonstrated that sodium chromate in correct concentration in calcium chloride brine will reduce corrosion of iron about 95 per cent. Corrosion of galvanizing and brass will be retarted about 90 per cent by proper use of the chromate.

"The most economical means of obtaining the material is to purchase sodium dichromate and convert this to sodium chromate by the addition of an alkali such as caustic soda. In many instances the inherent alkalinity of calcium chloride may be employed as a part of the neutralizing material, thereby reducing the quantity of caustic soda which is required. Assuming that sodium dichromate is added to a neutral brine, the amount of caustic soda required, is 27 pounds for each 100 pounds of the dichromate. The total amount of sodium dichromate which should be used is 125 pounds for each thousand cubic feet of calcium chloride brine.

"If corrosion inhibitor is to be used in the system, the sodium dichromate may be added to the water, together with the proper amount of caustic soda. The recommended practice is to dissolve 100 pounds of commercial sodium dichromate in about 20 gallons of water and add to it about 27 pounds of caustic soda, stirring until dissolved. This solution should be added to the brine gradually at a point of fairly rapid circulation. During such addition pH measurements should be made for close control of alkalinity."—H. P. Hayes.

ANSWER No. 2: As indicated by the late Professor Venemann's remarks on Question 1032, much has been written about corrosion inhibitors and brine treatment. Perhaps the most convenient recent reference for NAPRE members would be the article beginning on page 53 of the 1954 NAPRE Operating Data Book. There are some typographical errors which are likely to confuse one who is attempting to read the entire article. However, the following quotation from page 63 may be enough to answer Question 1064.

"The suggested dosage for chromate protection amounts to 15 lb. sodium dichromate or 9 lb. chromic acid per 1000 cu. ft. of brine. If the make-up water does not turn pink with P indicator (phenolphthalein solution) it may be considered within the desired range of pH values, and the chromate treatment should be followed by just enough caustic soda to maintain a mildly alkaline condition. It takes 0.27 lb. caustic soda per lb. of sodium dichromate, or 0.8 lb. caustic soda per lb. of chromic acid, to restore the treated brine to about the same pH value as that of the make-up water.

"If the make-up water is sufficiently alkaline to turn pink when a few drops of P indicator are added to a sample, then the caustic dosage should be omitted."—K.M.H., St. Louis, Mo.

Challenges Practical Use Of Artificial Head Pressures

QUESTION NO. 1065: On page 17, April '55, INDUSTRIAL REFRIGERATION, under "Operating Practice", there is a statement "During the winter, the head pressure is allowed to drop no lower than about 110 psig so that the evaporators—some of which are several hundred feet away from the compressor room—will be adequately fed with liquid". I know there is room for lots of improvement there.

There is one plant known to me in particular, where the farthest evaporator is more than 200 feet from re-

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ceiver and condenser. Pressure in winter plenty of times is less than 75 psig, and this has been in operation since 1926. Sooner than carry high condenser pressure in winter, larger liquid lines for distant evaporators would be less expensive.—M.S.J., Baltimore, Md.

ANSWER: Some questions and comments in the NAPRE Question Box have brought out for open discussion the practice of maintaining an artificially high condensing pressure during the winter.

The practice of maintaining condenser pressures, higher than necessary, originates from the need which sometimes arises from feeding an adequate supply of liquid through the expansion valve. A Phillips No. 301-H valve with a 9/32 inch orifice, for example, can feed enough ammonia for 66.7 tons of refrigeration when the pressure difference across the valve is 160 pounds. When the pressure difference is 40 pounds, the same valve can feed enough ammonia for only 38.7 tons.

As an example, let us say that the expansion valve needs 70 pounds pressure difference to feed an adequate supply of liquid. If the suction pressure is normally 45 psig, the condenser pressure must be maintained at 115 psig or higher. An alternate method of maintaining adequate feed during the winter would be to let both the suction and discharge pressures drop — still maintaining a 70-pound differential. The expansion valve would still feed properly with a head pressure of 95 psig and a suction pressure of 25 psig.

Here is an important point which is sometimes overlooked. The power costs will be greater per ton of refrigeration at the 95-25 psig condition than they will be at the 115-45 psig operation. Catalog data for a 2-cylinder ammonia compressor shows the horsepower per ton to be 0.705 at 115-45 psig and 0.743 hp per ton at 95-25 psig. The reason is that the suction pressure has a greater influence on performance than the discharge pressure.

To summarize, if a certain pressure difference must be maintained to feed the evaporator, it is better to do it in the higher pressure range.

There are other methods of conquering the problem of adequate expansion valve feeding without the waste of power in raising the head pressure, and I am sure that some of your readers will discuss expansion valve by-pass arrangements and pumps which build up the pressure between the receiver and expansion valve.—W.F.S., Champaign, Ill.

Seeks Device For Detecting Ammonia In Condensing Water

QUESTION NO. 1066: Is there an instrument either electrical or mechanical that may be installed in a fresh water system, in particular ammonia condensers where there are four or five in use at all times, that will detect ammonia present in fresh water. It would be appreciated if I could get the names of the manufacturers if there is such an item.—T.E.McC, San Francisco, Calif.

ANSWER: I do not know of either an electrical or a mechanical instrument specifically designed to detect the presence of ammonia in fresh water. There are, however, a few possible approaches which could provide the required answers.

The first solution which occurs to me would be the use of a pH meter. I believe the instalation of a suitable set-up would cost about $800.00. In view of possible variations in incoming water supply, I feel that a differential hookup which would provide a comparison of water entering and leaving the condenser would be the most desirable approach.

Another method would be to install a system for comparing variation in electrical conductivity between incoming and leaving water. A third approach might be made on the basis of turbidity. Here again, I would be inclined to approach the problem on the basis of differential or comparison of entering and leaving water.—T.D., San Francisco, Calif.

Wants Description On Use Of Watt-Hour Meter

QUESTION NO. 1067: Would Chief Engineer Rouse (Northland Center, Detroit) care to describe how watt hour meters are used to reconcile meter readings for tenant chilled water uses at Northland? (See INDUSTRIAL REFRIGERATION, January, 1955)—F. H., St. Louis, Mo.

(Continued on Page 52)

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ASME Refrigeration Talk On Low-Load Use Of Centrifugal

ADVANTAGES of prerotation vanes as a means of improving the part-load performance of constant-speed centrifugal refrigerating compressors was outlined for engineers attending the semi-annual meeting of The American Society of Mechanical Engineers in Boston on June 20. In a paper entitled, "Part Load Performance In Centrifugal Refrigeration," the author, Arthur M. G. Moody, development engineer, The Trane Company, LaCrosse, Wis., discussed several methods available for reducing power input to partly loaded centrifugal compressors, and for broadening their operating range.

He pointed out that refrigeration compressors for air conditioning service are subjected to considerable variation in load. Only for a relatively short period each year is the load close to design value, and at times it may be nearly zero. Even within short intervals of time, loads may vary from minimum to maximum values. The load remains reasonably constant at some value between zero and maximum at other times.

One disadvantage of the centrifugal compressor, according to Mr. Moody, is its characteristic of surging on light loads. This minimum capacity limitation prohibits continuous operation of the machine through the range from full to zero load; therefore, wide variations in refrigerating load previously could be handled only by cycling a conventional machine on-and-off. This on-and-off operation above a minimum frequency is harmful to the driving motor and compressor. It increases motor operating temperatures and causes greater wear on sleeve bearings.

Mr. Moody related that studies of these problems led to the development of prerotation vanes as a method of reducing power input as the refrigerating load drops off and to broaden the operating range; to move the surge point back nearer the zero load point, thus improving the machine's efficiency. The author presented operating curves with his paper.

Second Naval Refrigerated Vessel Launched

SECOND of a pair of new type refrigerated ships for the Navy was launched by Ingalls Shipbuilding Corporation, Pascagoula, Mississippi. The second, USS Vega, is the sister ship to the USS Rigel launched by Ingalls on March 15. Although not the first refrigerated store ships used by the Navy, they are the first specifically designed as such and built from the keel up with that purpose in mind.

Refrigerated warehousemen will be interested in the fact that these vessels have a capacity of 350,000 cubic feet of frozen cargo in a total of 53 storage compartments. With electro-hydraulically operated hatch covers and similarly operated cargo winches, with modern package and food handling equipment installed below decks, this vessel is intended to replenish fighting ships at sea. Vertical conveyors and fork lift trucks can be used below decks in making up an order at sea in much the same manner as cold storage warehousemen use their break up rooms for servicing the local customer. Use of refrigerated auxiliary such as the Rigel and Vega should extend time at sea for task forces by at least three months.

The ships are 475 feet in length, 72 feet in breadth and a water line depth of 43 feet. They are of 15,000 tons displacement, propelled by 12,500 shp plant, and capable of maintaining fleet speeds for replenishment at sea operations.

Production Engineering Show

THE first production engineering show, a new series of annual expositions which will feature equipment for automation and production in all types of industries, will be held at the Navy Pier, Chicago, September 6-16, produced by Clapp & Poliak, Inc., New York, to coincide with the Machine Tool Show, which will be held at the International Amphitheatre.

The twin shows are expected to attract more than 100,000 visitors. About 80,000 net square feet of display space at Navy Pier will be used by exhibiting companies there. The Machine Tool Show, also managed by Clapp & Poliak, is the largest single-industry exposition in the country.

One of the major features of the Production Engineering Show will be a joint presentation by eight universities of their latest research in fields which may have an important bearing on industrial production in the future. Universities include Case Institute of Technology, Cornell University, Illinois Institute of Technology, University of Illinois, Massachusetts Institute of Technology, University of Michigan, Northwestern University and Ohio State University.

Fleets of buses will take visitors from downtown hotels to both Navy Pier and the Amphitheatre. A helicopter service will also fly between the twin shows. This service, the first such ever tried in any city, will supplement bus service between the two exposition points.

The Production Engineering Show will have on display eight major types of equipment designed to reduce production costs and bring closer the day of the automatic factory. The eight types to be shown include monitoring equipment, governing equipment, special production equipment, equipment components, materials handling equipment, communications equipment, inspection and gaging equipment and machine tool accessories.

COMING CONVENTIONS

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
October 14-15, 1955
Peabody Hotel, Memphis, Tenn.
KENNETH E. TROMBLEY, Director.

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 8-10, 1955
Ambassador Hotel, Los Angeles, Calif.
J. RICHARD KELAHAN, Secretary

NATIONAL ASSOCIATION OF ICE INDUSTRIES
November 15-18, 1955
Biltmore Hotel, Los Angeles, Calif.
GUY W. JACOBS, Exec-Secy.

AIR CONDITIONING and REFRIGERATION EXHIBIT
November 28 through December 1, 1955
Atlantic City Exhibition Hall, Atlantic City, N. J.

DELTA STATES ICE ASSOCIATION
December 4-6, 1955
Buena Vita Hotel, Biloxi, Miss.
MRS. EDNA VAUGHAN, Secretary

SOUTHWESTERN ICE MANUFACTURERS ASSOCIATION
December 11-13, 1955
Gunter Hotel, San Antonio, Texas
P. A. WEATHERRED, Secretary-Counsel

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS
December 1-3, 1955
Traymore Hotel, Atlantic City, N. J.
R. C. CROSS, Executive Secretary

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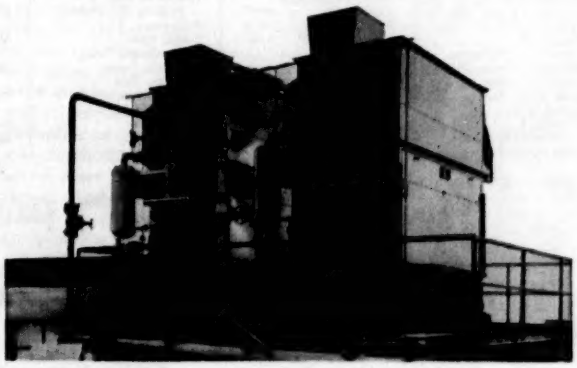

(Continued from Page 49)

ANSWER: The total refrigeration meter readings which read in therms of 100,000 Btu. are taken as a composite. These are reconciled against all costs of production such as kilowatt-hours input to approximately 5,000 horsepower, total water used in the cost of production, and on other fixed charges such as labor, taxes, insurance, etc. to arrive at a unit cost of a therm or the unit cost of production per sum. This reading then in turn is used for revenue billing to the tenant.

(Total units of production and total cost of production is divided by the total output of therms which in turn gives the cost of production per therm.)—C. R. (Northland) Detroit

Complains of Problem With Tobacco Plant Humidistat

QUESTION NO. 1068: In our cigar factory we attempt to maintain 70 F dry-bulb temperature with 70 percent relative humidity. An air washer system is used. In winter and during mild weather the temperature is controlled by a thermostat which operates a damper and a steam coil in the by-pass duct over the washer. The humidity is controlled in winter and during mild weather by a humidistat which controls the outdoor air and return air dampers. In summer the humidistat controls the water temperature in the washer. The temperature control is satisfactory, but the humidistat action is somewhat erratic and slow probably due to tobacco dust settling on the sensitive hairs in the humidistat. How can this be corrected?—P.C., W—S, No. Car.

ANSWERS Tobacco dust is hygroscopic and probably has a different affinity for moisture than the hairs in the humidistat. This difference in affinity for moisture will change the control point of the humidistat. If the washer has high saturation efficiency, the humidistat may be replaced with a thermostat inserted into the tank of the washer. For a washer of high saturation efficiency the dew-point temperature of the air leaving the washer approximates closely the water temperature in the tank. Since very little moisture is normally absorbed or given up in the factory space, the dew-point temperature in the factory space will be substantially the same as that of the supplied air.—N.S., San Luis Obispo, California

New Questions

Prefers Separate Compressor Over Back-Pressure Hook-up

QUESTION No. 1069: Fig. 1, page 15, April 1955, I.R., does not show any suction header on the five compressors, but reading center column, page 15, denotes the gas from desuperheater flows into a header that runs to all compressors. Also the gas from water chiller enters a common header that serves all compressors. Now, this high pressure gas to be handled efficiently should not have to go through a back pressure valve and let down to a lower pressure, but should be handled by a compressor of right size and speed to maintain the desired pressure in water chiller at all times.—M.S.J., Balto., Md.

Seeks Air Volume Per TR For Air & Evaporative Condenser

QUESTION No. 1070: Is there a rule of thumb on the volume of air required through an air-cooled condenser per ton of refrigeration, for normal Midwest Summer Conditions (90-95F, D.B.); also for an evaporative condenser?—P.V.N., Elkhart, Ind.

Gauge Glass Hallucinations?

QUESTION NO. 1071: Our air conditioning consists of coils for chilled water placed in the air ducts near the supply fans. In the engine room is a water chiller in which the water goes through the tubes and the ammonia is around the tubes. At the side of the cooler is a vertical surge tank. The pumps draw water from the surge tank, force it through the cooler, and then upstairs.

Recently I had a bit of trouble with the pump. The motor was O.K. but the pump acted like it was losing its suction all the time. Now here's the

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payoff! This vertical tank I speak of has two long gage glasses overlapping at the center of the tank. While I was having pump trouble the upper glass was half-full and the lower glass was completely full. So I assumed I had plenty of water there. But I was told the tank was nearly empty. If this is the case, what held the water in that upper gage glass? I know it was not plugged as I blew it out and the water came back all O.K.

Can that tank be full of air and low water and still hold water in the upper gage glass? As long as the glass is fully open on each end why wouldn't the water drain out even with a tank full of air? We generally keep a small amount of air on top of the water to cushion it. However, the day man says it was about empty and the water was up all O.K. in that upper glass. Have you ever heard of such a happening?—R.G.S., Buffalo, N.Y.

Alcohol In Air System An Explosive Hazard?

QUESTION No. 1072: I recently read of an interesting practice in air-operated refrigerator doors. A plant using such doors was experiencing difficulty with moisture freezing in the air lines due to the fact that the lines passed through low temperature rooms. There was repeated freeze-up despite the use of moisture traps and separators in the compressed air system.

The operating engineer developed a means of admitting alcohol to the compressor air intake. Alcohol is thus drawn into the air system to lower the freezing point of the moisture in the system sufficiently to prevent freeze-up in the lines. It seems to me that this might be a dangerous practice. Wouldn't there be risk of an explosion from the alcohol-air mixture?—J.R.K., Chicago.

Freezer Floor Repairs

QUESTION NO. 1073—What has been the experience of the members repairing concrete floors in freezer rooms (minus 10 to minus 20 F)? What material was used? Were repairs made while the rooms were in service at these temperatures? Wm. L. P., Jr., Memphis.

News of People

JAMES EMMETT, JR., vice-president of James P. Marsh Corp., Skokie, Ill., has been elected president of the Air-Conditioning and Refrigeration Institute. M. M. Lawler, vice-president of Worthington Corp., Harrison, N.J., was elected vice-president of the institute.

DEATHS

John F. O'Neill

THE DEATH of John F. O'Neill, director of sales for 36 years of The Central Cold Storage Co. Chicago occurred July 24, resulting from a heart attack. He was 61. Mr. O'Neill had been active in the cold storage industry for 44 years. He was a member of the Chicago Mercantile exchange and was known from coast to coast in the poultry, egg, meat, produce and related lines. He was a member of The American Legion. He leaves his widow, Mrs. Irene O'Neill and two brothers.

Walter Nelson

THE DEATH of Walter Nelson, Muncie, Ind. occurred June 6. Mr. Nelson, an ice man of many years standing, was owner of the City Ice & Cold Storage Company, Muncie.

JOHN G. HOLLMEYER, vice-president and general manager of the Seaboard Terminal and Refrigeration Products Company, Jersey City, N.J. died July 3. He was 64.

Irradiation of Foods

(Continued from Page 3)

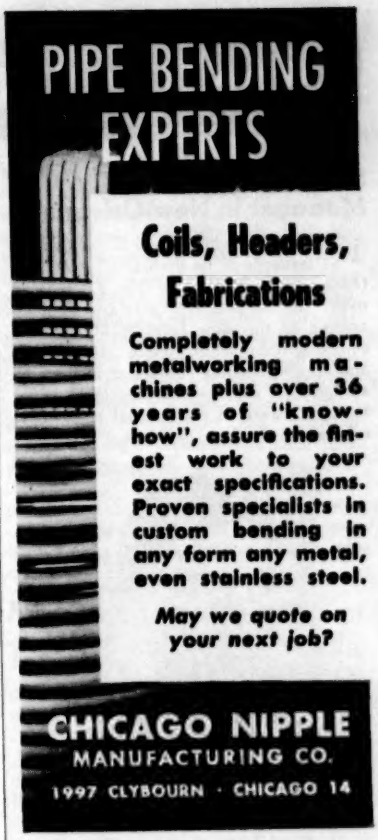
commercial use of radiation sterilization of foods within the next ten years. No one in the food business would be foolish enough to predict that it can't be done, but even if it can be, then we are confronted with almost insurmountable problems of processing costs and suitable packaging."

Another drawback, it is pointed out, is that some foods are affected by off-flavors and color, and there may be adverse effects on some of the vitamins.

Food processors appear to be taking lightly the threat of possible adverse effect on the refrigerating process and none of them seem to be afflicted with "worries."

"It is quite likely," one processor says "that with the potential development of pasteurization by means of irradiation, the need for refrigerated storage will increase rather than decrease. Even with food products that are sterilized by irradiation, refrigeration may still be desirable to inhibit the chemical and enzymatic changes which frequently cause deterioration. For many years to come, food irradiation will have absolutely no effect on food freezing or refrigerating".

An insulation specialist puts it this way: "Irradation of foods will have wider utilization in extending storage life of foods kept under refrigeration than in preserving foods not so kept.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MANUFACTURERS' NEWS

Sanders New Frick Manager in New Orleans

THE appointment of John T. Sanders III as manager of its branch office in New Orleans is announced by The Frick Company. Mr. Sanders is a graduate in engineering at the Rice Institute at Houston, and has been selling Frick refrigerating and air conditioning equipment in the area around that city for the past eight years. He is a registered professional mechanical engineer in the State of Texas.

John T. Sanders III

He served in the Second World War as a Captain in the Aircraft Maintenance in the China Theatre. Since last September he has been doing sales work at the main office of Frick Company, in Waynesboro. He assumed his new duties July 1.

The Frick Branch Office in New Orleans is at 235 Humble Building, 909 South Jefferson Davis Parkway.

Vogt Observes Anniversary

TO CELEBRATE its seventy-fifth anniversary the Henry Vogt Machine Company, Louisville, Ky., presented a program in the Memorial Auditorium of Louisville. The program consisted of addresses by The Hon. Andrew W. Broaddus, Mayor of Louisville, John R. Carpenter, president of the Chamber of Commerce, William W. Heuser, vice-president of Henry Vogt Company, and Henry V. Heuser, executive vice-president; presentation of service pin awards by Leland D. Schlegel, secretary and treasurer; presentation of anniversary souvenirs by Glenn W. White, cost and payroll department; and a presentation by Irvin Fleitz.

The program was concluded with very interesting entertainment, with music furnished by Bob Hutsell's orchestra.

To further commemorate the occasion a beautiful souvenir program was presented to each guest, containing portraits of the officers, a historical sketch of the company, and a service roll of honor listing those who had been with the company for 15 to 50 years. Leading the list were the 50-year veterans: Joseph B. Fogle, William H. Hall, Gustave A. Heuser, and Benjamin F. Kubaugh.

Giant Cooling System For Washington

CONSTRUCTION has started on a giant cooling system to be installed in the Capitol Power Plant in Washington, D. C., from which it will serve the air conditioning systems in seven large government buildings within a two-mile circle. The work is being done by the York Corporation.

Four large centrifugal refrigeration units using about 10,000 horsepower will provide chilled water to a loop system holding about 600,000 gallons and which government engineers say is the largest hydraulic refrigeration system of its kind in the world.

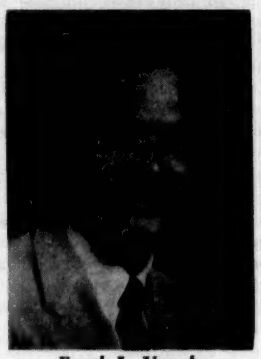
Stewart Lauer, York president, said that York Corporation is executing several contracts entered into with nationally known Safeway Stores to equip a number of new warehouses in the middle and far west with ultramodern systems of industrial air conditioning for both processing and preservation of food for their chain stores. The expenditure for these systems is upwards of $2,000,000. And he mentioned that the well known John Wanamaker Philadelphia store was being equipped with York centrifugal cooling systems using 2,100 horsepower.

In commenting on the general business of the York Corporation, Mr. Lauer said that following several early months of their fiscal year, during which sales and earnings were adversely affected while inventories of packaged air conditions were being adjusted in the factory and field, the situation is well in hand now as evidenced by results of the three months ending May 31.

During this period net sales amounted to $27,000,000 and net earnings after taxes were better than $1,400,000. This compares with $30,000,000 sales and $1,240,000 net earnings during the same period a year ago.

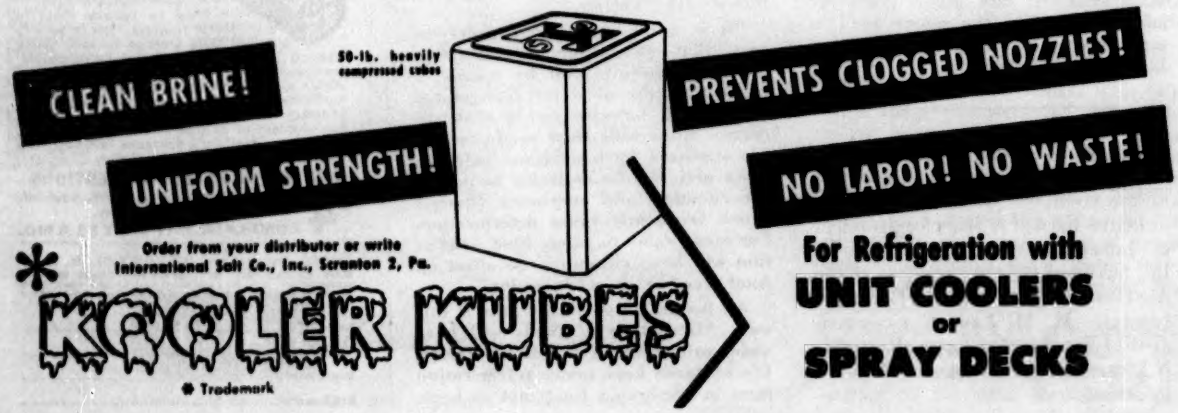
Vaughn Joins Sporlan

THE appointment of Frank L. Vaughn to its field sales organization is announced by The Sporlan Valve Co. Mr. Vaughn, a graduate of the University of



Frank L. Vaughn

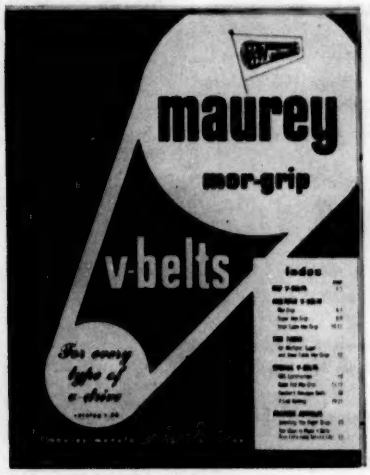
Alabama, was formerly with a large air conditioning and refrigeration manufacturer and is well experienced in that field. He will open Sporlan's new Birmingham branch from which he will cover Alabama, Mississippi and parts of Louisiana, Florida and Tennessee. This territory was formerly serviced from Sporlan's Atlanta, Georgia Office.



CATALOGS AND BULLETINS

Catalog On V-Belt Drives

THE complete line of Maurey Mor-Grip Fractional Horsepower and Heavy Duty Multiple V-Drive Belts are described in a new 3 color, 24 page catalog released by the manufacturer. The Multiple line is



most complete and consists of super, steel cable, open end and Hexagon V-belts as well as V-link belting. Each type of V-belt is completely described as to its construction and applications. The busy engineer who wants concise and complete information will welcome the Maurey catalog for his file.

Detecting Ammonia Leaks

A NEW pocket-size device for detecting ammonia leaks is being offered to ammonia users by Nitrogen Division, Allied Chemical & Dye Corporation. The device is a booklet containing paper strips impregnated with phenolphthalein. By tearing a strip from the book, saturating it with water and holding it near suspected leaks, the user can detect the presence of ammonia when the color of the paper turns red.

Booklet on Brine

BRINE for Today's Industry is the title of a new booklet on the Lixate Process published by the International Salt Company. This 32-page booklet replaces The Lixate Process for Making Brine that has been a standard reference for brine users for many years. The new booklet contains more technical information than its predecessors and should prove to be even more helpful to industrial brine users.

The International Salt Company has pioneered in modern brine production methods and precise brine strength control. The Lixate Process brings brine-making up to the efficiency levels of other modern mass production methods. It centralizes the entire operation; works automatically; eliminates practically all handling of salt, and greatly reduces costs. It saves salt, simplifies salt storage; provides its own reserve store of brine, and produces a constant flow of pure, crystal-clear, fully saturated brine when it's needed and where it's needed.

Bulletin on Can Fillers

ACCURATE Can Fillers is the subject of a four-page Bulletin issued by Knickerbocker Stamping Co., Parkersburg, W. Va. It describes and illustrates can fillers made in sizes to suit various needs. It includes also illustration and description of welded ice cans and rivited ice cans, all made in sizes to meet needs of the trade; and can grids, core fillers and suckers, and a brine testing kit.

Catalog on Pumps

A NEW catalog on coolant, circulating, and agitating pumps, has been issued by Graymills Corp. Chicago, manufacturer of nationally known coolant pumps. It is a comprehensive catalog on pumps, designed for easy reading, illustrated and with description of the various models.

Carrier Absorption Manual

ABSORPTION refrigerating machines which produce large-capacity cooling from steam, have no major moving parts, and use plain water as a refrigerant, are described in a new 36-page catalog prepared by Carrier Corporation, Syracuse, N. Y. The catalog has been designed for use by laymen as well as technicians and consulting engineers. Operation of the complex refrigeration cycle is explained in four simple steps. Important features of the absorption machine are illustrated. Capacity ratings (100 to 700 tons) are listed in easy-to-read tables, and physical characteristics for the line of 22 different models are shown in a double-page chart.

Also included is a comprehensive list of installations for comfort and industrial processing with representative photographs. Helpful engineering data includes illustrated nozzle arrangements for both internal coil and open type machines, pipe connection data with diagrams, plus sections on electric wiring and how the control system functions.

Air Conditioning Guide

INDEPENDENT consulting engineers' views on air conditioning of television studios, office buildings, banks, motels, and department stores are presented in the 1954 Architectural File Folder, available through the Du Pont Company's "Kinetic" Chemicals Division. Issued annually since 1949 as an industry service, the folders contain reports on air conditioning installations in specific types of buildings.

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

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USED EQUIPMENT—wanted & for sale

FOR SALE—1 Y30 York, 8x8, no motor, with grooved pulley and V belts. The Gus A. Regnier Refrigerating Engineering Co., 532 Winchester Ave., New Haven, Conn.

FOR SALE—One V type 4 cylinder York, 3¼x 3", 850 r.p.m. One new York shell & tube condenser, 12"x7'6", with 46-1¼" tubes. 5x5, 8x8, 9x9 Yorks. Write E. Niebling, 1546 St. Clair Ave., Mount Healthy, Cincinnati 31, Ohio.

FOR SALE—Compressors, 4x4, 6x6, 7½x7½, 8x8, 9x9, 9½x9½, 10x10; 75 ton evaporator condenser, 30 ton York trunk type coil complete. Ice plants, cans, cranes, agitators, blowers. Parke Pettegrew, 370 West Broad St., Columbus 8, Ohio.

WANTED—An automatic purging device that will handle approximately 150 ton of ammonia refrigeration, preferably a Frick system. Central Nebraska Packing Co., P.O. Box 754, North Platte, Nebr.

FOR SALE — Refrigeration equipment; ice equipment; new, used. Advise us your needs. Use "QUICKSEAL" — stops brine tank leaks; easy, efficient, economical. Born Company, 80 East Jackson Boulevard, Chicago 4, Illinois, WAbash 2-5299.

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10x10 York direct to 125 h.p., 360 rpm motor.
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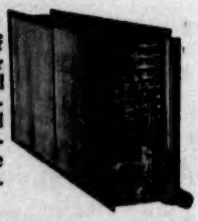

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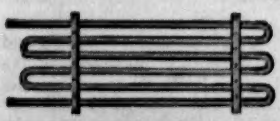

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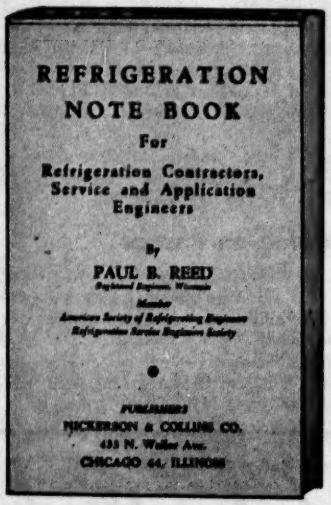

Vest Pocket Size—3⅛ x 5 Inches
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THIS NOTE BOOK of condensed refrigeration information represents many years of work in accumulating practical data—"culling out" all extraneous material—so as the author states, "the reader will find a handy and easily carried source of information not usually kept in memory."

You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

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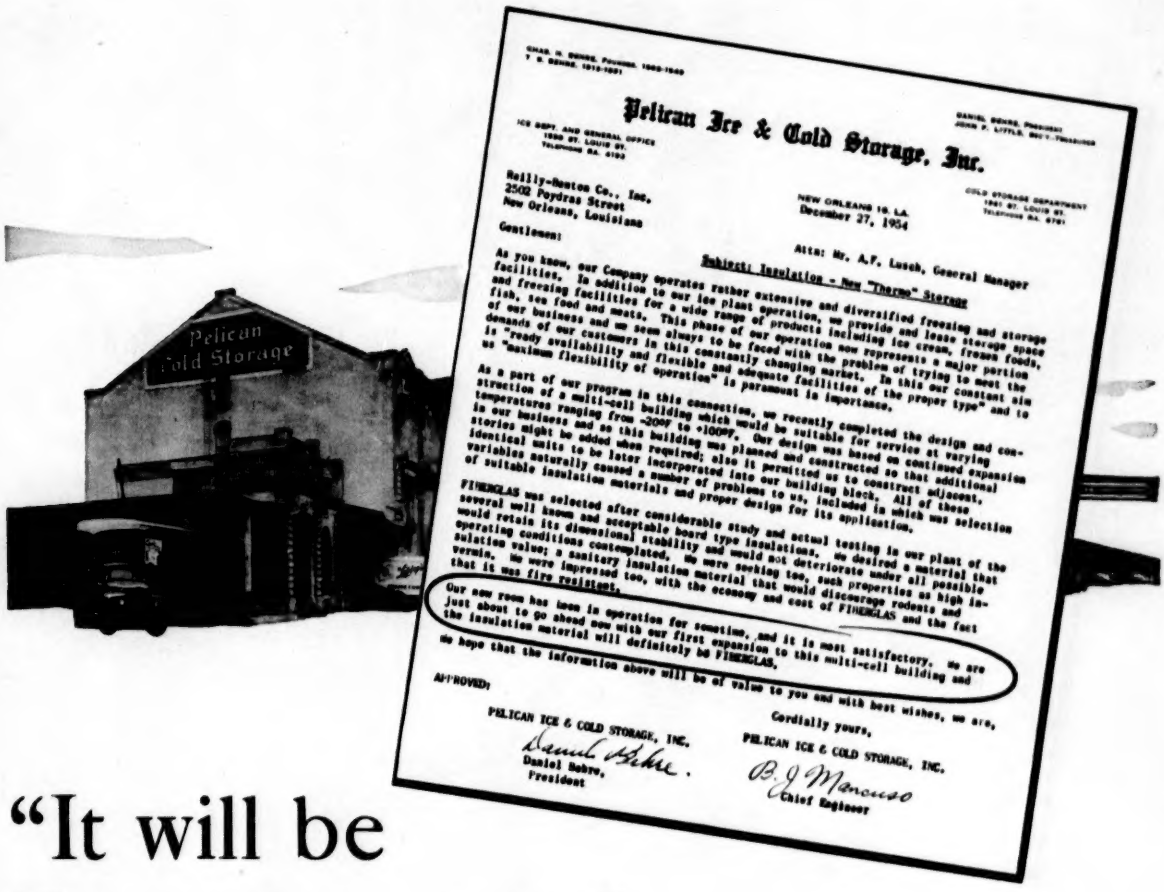
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Cold Storage
Pelican Ice & Cold Storage, Inc.
Reilly-Benton Co., Inc.
2502 Poydras Street
New Orleans, Louisiana
December 27, 1954
Attn: Mr. A.F. Lusch, General Manager
Subject: Insulation - New "Thermo" Storage
Gentlemen:
As you know, our Company operates rather extensive and diversified freezing and storage facilities. In addition to our ice plant operation, we provide and lease storage space and freezing facilities for a wide range of products including ice cream, frozen foods, fish, sea food and meats. This phase of our operation now represents a major portion of our business and we seem always to be faced with the problem of trying to meet the demands of our customers in this constantly changing market. In this our constant aim is "ready availability and flexible and adequate facilities of the proper type" and to us "maximum flexibility of operation" is paramount in importance.
As a part of our program in this connection, we recently completed the design and construction of a multi-cell building which would be suitable for service at varying temperatures ranging from -20oF to +100oF. Our design was based on continued expansion in our business and so this building was planned and constructed so that additional stories might be added when required; also it permitted us to construct adjacent, identical units to be later incorporated into our building block. All of these variables naturally caused a number of problems to us, included in which was selection of suitable insulation materials and proper design for its application.
FIBERGLAS was selected after considerable study and actual testing in our plant of the several well known and acceptable board type insulations. We desired a material that would retain its dimensional stability and would not deteriorate under all possible operating conditions contemplated. We were seeking too, such properties as high insulation value; a sanitary insulation material that would discourage rodents and vermin. We were impressed too, with the economy and cost of FIBERGLAS and the fact that it was fire resistent.
Our new room has been in operation for sometime, and it is most satisfactory. We are just about to go ahead now with our first expansion to this multi-cell building and the insulation material will definitely be FIBERGLAS.
We hope that the information above will be of value to you and with best wishes, we are,
Cordially yours,
APPROVED:
PELICAN ICE & COLD STORAGE, INC.
Daniel Bohre,
President
PELICAN ICE & COLD STORAGE, INC.
B. J. Mancuso
Chief Engineer

"It will be Fiberglas again,"

says New Orleans cold storage plant engineer after first use of PF Dry Wall Construction

B. J. Mancuso
Chief Engineer

Pelican Ice and Cold Storage, Inc., of New Orleans, constructed a unique basic building unit containing "cells" for storing foods at temperatures ranging from *minus 20° to plus 100° F.*

The problem of insulation came in for intensive study. As Chief Engineer B. J. Mancuso summed up the situation, they sought a low-cost material that "would retain its dimensional stability . . . would not deteriorate . . . had high insulation value." Tests were made on several insulations.

In addition to meeting these requirements, Fiberglas PF Dry Wall also provided *fire-safety*. As a final test, it was installed in the initial multi-cell building unit. Results were so successful that in the expansion program now under way, "*the insulation material will definitely be Fiberglas.*"

Every storage or freezing plant management thinking of building or modernizing should have the facts about this amazing Fiberglas development. Send the coupon today and get them for yourself! Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.

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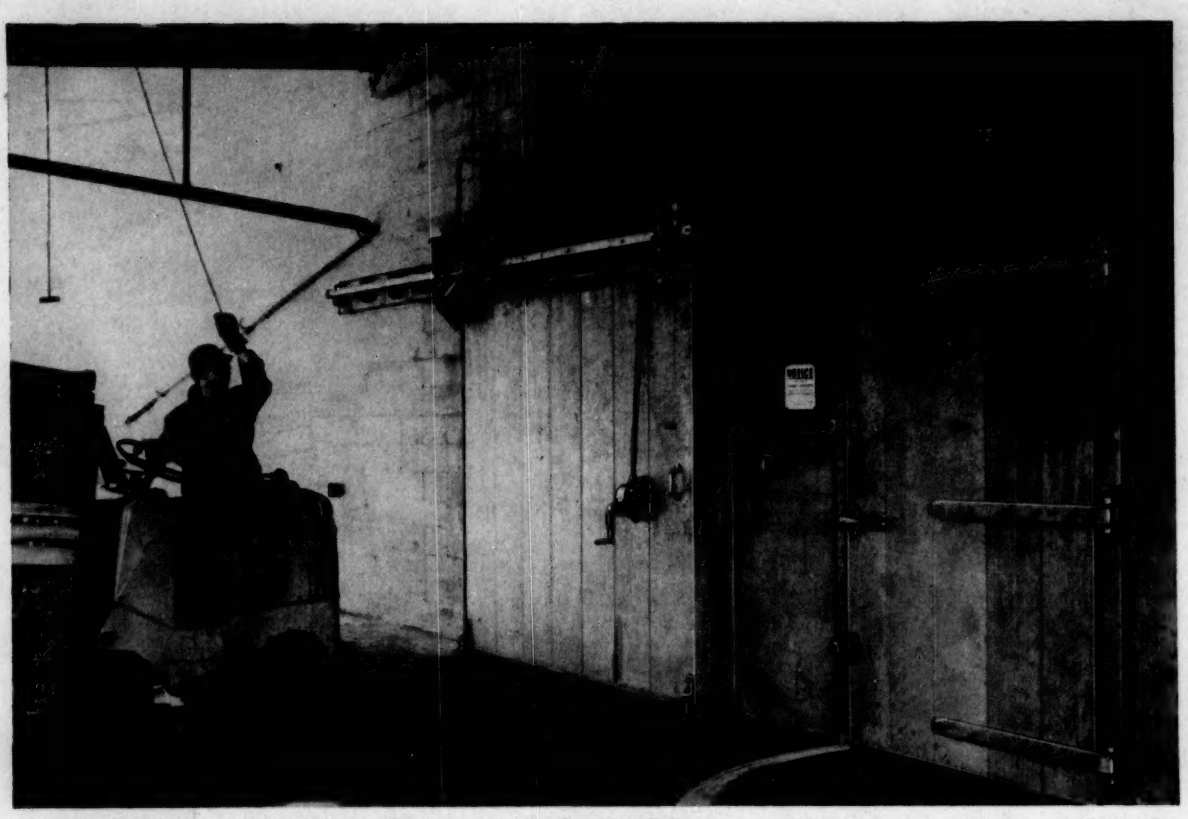
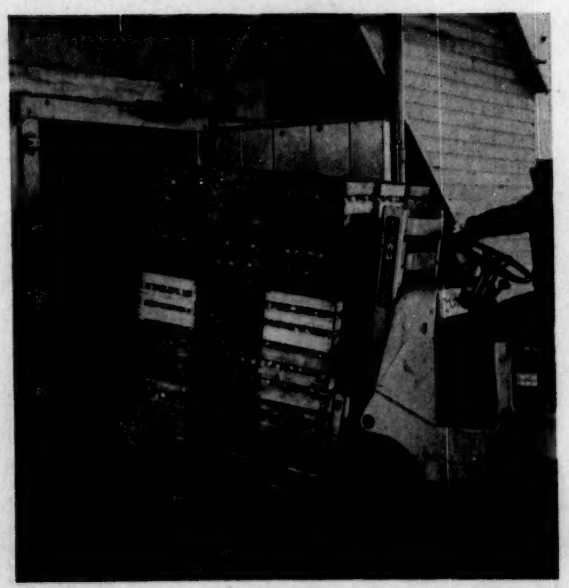


Jamison Horizontal Sliding Door saves space on the loading dock. Remote power operation saves operator time and effort.

Power Operation of JAMISON Doors Speeds Handling for Food Processor



Ample width of metal clad Series "50" door opening allows adequate clearance for truck and load.

C. H. Musselman Co., producers of food products at Biglersville, Pa., selected Jamison Doors for their apple cold storage. This gave them the efficient insulation and effective seal of Jamison door design. For rapid, automatic operation, both doors are equipped for remote power operation which saves time, and effort.

Count on Jamison Doors to solve your particular problem. Consult your architect or write direct to Jamison Cold Storage Door Company, Hagerstown, Md., U.S.A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.